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THE HORSE MEAT BUSINESS AND RELATED MATTERS

DISCUSSION BY THE CENTRAL VETERINARY SOCIETY*

Mr. H. E. Bywater: Articles in the popular Press, the agitation of animal welfare societies, questions in Parliament and, finally, the appointment of the Committee of Enquiry into the Slaughter of Horses under the chairmanship of Lord Rosebery have all focused attention on the horse meat business. Recently I had the task, in conjunction with Mr. T. L. Wright and Professor McCunn, of submitting evidence to the Rosebery Committee on behalf of the N.V.M.A., and much that I would wish to say is incorporated in that evidence, copies of which have been passed round. I shall, therefore, not bore you by reading the evidence *in extenso* but will merely draw attention to some of its salient points, adding further observations where I think desirable, and deal with other matters not touched upon in that document.

Prior to the late war, the trade in horse flesh for human food, whether for export or consumption in this country, was largely in the hands of those firms of horse slaughterers whose main business centred around the knacker's yard. This was due to the fact that for a few, hundred years, during which time the motive force of all road transport was the horse, the only means of disposing of a horse unsuitable for normal use was through the knackerman. Hence the popular conception of a "knacker."

When the export of horse flesh became an established trade, in the early days of the present century, these firms of knackermen set aside part of their premises, or acquired separate premises, to be licensed as slaughterhouses in order that horses could be prepared for human food.

SLAUGHTERHOUSES AND KNACKERS' YARDS

It is a common fallacy to assume that a slaughterhouse deals only with animals, the flesh of which is normally sold in the ordinary butchers' shops, *i.e.*, cattle, sheep and pigs, and that a knacker's yard deals with horses of all kinds as well as other animals, the flesh of which is unfit for human consumption. The Protection of Animals Act, 1911, defines a knacker as "a person whose trade or business is to kill any cattle not being killed for the purposes of the flesh being used as butcher's meat," and the expression "knacker's yard" means "any building or place used for the purpose, or partly for the purpose of such trade, or business," while the expression "cattle" includes "any horse, ass, mule, bull, sheep, goat or pig." The Food and Drugs Act, 1938, Section 100, defines a slaughterhouse as "any premises used in connection with the business of slaughtering animals, the flesh of which is intended for sale for human consumption," and a knacker's yard as "any premises used in connection with the business of slaughtering, flaying or cutting up animals, the flesh of which is not intended for human consumption."

Section 19 of this Act, states that "No person shall sell, or offer for sale, for human consumption any part of an animal which has been slaughtered in a knacker's yard." Under the Livestock (Restriction of Slaughtering) (No. 2) Order of 1940 all meat from knacker's yards must be coloured green with specified dyes as also must meat unfit for human food. The greening process is not always carried out with the same degree of efficiency and, furthermore, the dye tends to fade fairly rapidly, especially if it is applied whilst the carcase is still warm or oedematous.

In order to use any premises as a slaughterhouse or knacker's yard, it is necessary to obtain a licence for this purpose from the local authority under the Food and Drugs Act, 1938. Such licences may be granted for a period not exceeding 13 months and may be renewed at each period of the expiry. Appeals may be lodged against a refusal to license or re-license, first with the court of summary jurisdiction and then with the quarter sessions, the decision of which is final—unless a question of law is involved when reference may be made to the higher courts.

When the Ministry of Food took over the business of buying and slaughtering all animals required to supply the public with rationed meat, it also took over the control of sufficient slaughterhouses for this purpose, and all other slaughterhouses previously engaged in this trade—being no longer able to slaughter animals for the normal meat trade—were virtually closed. The comparatively negligible number of premises engaged in the slaughter of animals used to produce unrationed meat, *e.g.*, horse and goat flesh, continued in use and, as this business developed, some of the slaughterhouses surplus to the requirements of the Ministry of Food were re-opened for horse slaughtering. Some of the latter are, apparently, not all that might be desired; indeed, this might be said of some of those operated by the Ministry of Food—if one is to accept the criticisms which one hears from time to time in the public Press and elsewhere.

The R.S.P.C.A. and the National Federation of Meat Traders' Associations have called the attention of the Ministry of Food to certain slaughterhouses operated by the Ministry which, by reason of age or inherent defects, were alleged unsuitable for use. In some cases, improvements have been effected, whilst in other cases, the Ministry have ceased to use such premises. Some of the less desirable slaughterhouses which had been in disuse since the introduction of food rationing, have been re-opened for the slaughter of horses and the following are excerpts taken from reports of such places by inspectors of the R.S.P.C.A.:—

> "A waiting stall practically in front of the slaughterhouse where horses awaiting slaughter are kept, but owing to constant use and overcrowding, the gates and doors get bent and broken occasionally and the horses can see right into the slaughterhouse. Up to about 12 months ago there was another waiting stall close by, but this was in such a bad state of repair that with constant pressure of the horses against the walls it collapsed one afternoon, though fortunately there were only a few horses in occupation at the time and these escaped injury. The slaughterhouse is very small and primitive, bone and entrails, etc., being strewn about the floors."

* Meeting held January 5th, 1950.

Referring to other premises used previously by the same slaughtermen, the inspector stated :—

"Because of these appalling conditions strong and constant objections were laid and eventually, but by no means before time, this abominable hole was closed down."

A report on yet another slaughterhouse reads :—

"A number of school children were standing near the entrance door of the slaughterhouse, which was wide open . . . one slaughterman threw a hide into the stable amongst the live horses. In the same stable as the live horses there were several hides, a large heap of bones and offal all over the floor. The animals awaiting slaughter had no bedding, no food or water, and in the stable nearly all the windows were broken. The water supply was inadequate. I saw two of the horses drink from a pool which contained a mixture of rain water, blood and mud. These animals had undoubtedly been without water for a considerable time."

The standards of supervision of slaughterhouses and knackers' yards throughout the country are characterised by marked variations; lack of adequate supervision by local authorities is not always confined to rural areas. There is no room for doubt that a more uniform system is needed in regard to the licensing of both slaughterhouses and knackers' yards and there is urgent need for a closer supervision of both. The majority of slaughterhouses and knackers' yards in this country compare very unfavourably with many to be found in other countries. Few contain efficient, modern by-product disposal plants and the smell and other objectionable features too often associated with their daily work is a national disgrace. An efficiently planned and operated slaughterhouse or knackery can be run with little or no nuisance to the general public; indeed, some of the really up-to-date Continental establishments operate in the very heart of cities almost without their presence being realised.

Slaughterhouses and knackers' yards should cease to be the responsibility of the local authority but should be licensed and supervised by a central authority and situated in such locations that they would better serve the community and cease to be a source of annoyance to the public. Under such a system, only premises which were adequately equipped should be allowed to function and the efficient utilisation of by-products, impossible under the present haphazard methods, should prove of no small economic advantage to the nation.

Knackeries should be so placed throughout the country that the disposal of knackers' animals (and now too often useless carcases) could be disposed of hygienically and efficiently. A central knackery board could be operated by the trade itself with adequate representation by the Government and other interested parties. Such an authority should have the power to license and control all knackeries which should be given the sole right, and the liability, to discharge their duties within suitable geographical boundaries. The Divisional Offices of the Animal Health Division of the Ministry of Agriculture and Fisheries could probably undertake the supervision of such centralised knackeries within their areas. In addition to the economic and social advantages of such a reorganisation, there is the very important matter of collection of statistics concerning animal mortality (an aid to the control of animal disease), disposal of the carcases of small animals (which could by arrangement be delivered to the central knackeries, if necessary) and the provision of pathological materials for research and teaching; all of which are lacking under our present unsatisfactory system of unorganised and haphazard private enterprise. The Ministry of Food, in December, 1948, assumed some supervisory function in connection with knackers' yards. The occupiers of such premises are now required to be licensed by this Ministry in addition to holding the local authority licence for their premises. Records are now required to be kept concerning the animals and carcases received into the knackery and such other information must be given as the Ministry of Food may request. It is obvious that the Ministry of Food introduced this measure to help prevent "black market" activities in connection with the slaughter of the rationed food animals, and it is not to be expected that any improvement in the general conditions appertaining to knackers' yards will follow the introduction of this legislation. In many cases it would be possible, and economical, to operate a central knackery in conjunction with a central slaughterhouse—the by-products plant serving both establishments.

Export of Horses

The trade in the export of horses from this country to the Continent of Europe is now very small as compared with that which existed before and after the 1914-18 war when there was a very extensive trade between this country and Europe in horses both for work and slaughter.

For many years, prior to 1911, the trade in the exportation of horses, many of which were obviously unfit for work and not a few even unfit to travel, was one which no right-minded person could condone and a widespread agitation was aroused against this trade by the animal welfare movement. Those unfortunate animals were either worked on the Continent under conditions which would never have been permitted in this country or, if sufficiently well nourished, were slaughtered for human food under conditions which were not free from criticism.

As a result of intensive public agitation, the Diseases of Animals Act of 1910 was introduced and thereafter some control was exercised over this trade. This Act and the Order made under it (aided by the Protection of Animals Act of 1911), made it illegal to export to Europe any horse, ass or mule unless it had first been examined and certified by a veterinary inspector (appointed by the Ministry of Agriculture) as capable of being conveyed and disembarked without cruelty. The veterinary inspector had power to slaughter, or cause to be slaughtered, without the consent of the owner, any animal which was in such physical condition that it was cruel to keep it alive. Animals severely injured during transport were required to be slaughtered with a suitable killing instrument which had to be provided on all ships carrying horses, asses and mules. Thoroughbreds which had been in this country for less than a month, those being shipped for racing or breeding purposes—if so certified by the Secretary of the Jockey Club—were excepted from the provision of the 1910 Act, also (by an Order) any horse intended for racing, breeding or exhibition. The Exportation of Horses Act, 1914, extended the provisions of certification to include that the animals should be capable of being worked without suffering. The restrictions were further extended by the Exportation of Horses Act, 1937, which requires that all animals shall be not more than eight years of age and of not less value than, in the case of a heavy draught horse, £25, a vanner £20 and an ass £3. These values are, of course, below the present-day prices and a revision is long overdue. The provisions relating to age and value do not apply to performing animals or animals intended for breeding or exhibition.

The legislation, as applied to horses, asses and mules exported for work or slaughter may be summarised as follows: The animals must be not more than eight years of age, not less than a specified value and capable of being worked, conveyed and disembarked without suffering.

We have no records concerning the number of animals exported before the operation of the 1910 Act but thereafter records are available and the figures for 1910–48 are as follows :—

Year	*No. of horses*	*Year*	*No. of horses*
1910	Not known	1930	9,063
1911	60,773	1931	6,178
1912	47,923	1932	3,652
1913	52,547	1933	3,179
1914	32,592	1934	3,175
1915–18	Nil	1935	2,670
1919	6,118	1936	3,134
1920	58,689	1937	2,882
1921	45,120	1938	3,280
1922	17,936	1939	2,668
1923	17,063	1940	2,056
1924	25,642	1941–44	Nil
1925	13,477	1945	26
1926	7,356	1946	1,279
1927	10,066	1947	1,239
1928	10,526	1948	4,290
1929	9,912		

In 1911 nearly 61 thousand; in 1912 practically 48 thousand; and in 1913 52½ thousand were exported to Europe. The trade ceased on the outbreak of the 1914–18 war but 32½ thousand horses were shipped, prior to the war, in 1914. The trade was resumed in 1919 but, save for two peak years, 1920 and 1921, when 58½ thousand and 45 thousand animals respectively were shipped, showed a steady and marked decline until 1940, when the capitulation of France, and the consequent closing of the Channel ports to our shipping, brought the trade to a sudden standstill. It will be noted that by 1937 the trade had declined appreciably and that the Act of that year did not apparently greatly influence the number of animals exported.

The export of horses for slaughter in Belgium was recommenced in 1945 when 26 horses were shipped, and the number increased from 1,279 in 1946 to 4,290 in 1948. As only young horses, certified as fit for work and capable of being carried without unnecessary suffering, are allowed to be exported, provided the legal safeguards are strictly observed, there should be no grave objections to the trade on humanitarian considerations but it is not always easy to ensure that the conditions of transport will invariably be strictly observed and one occasionally hears of alleged infringements.

Many factors have combined to limit the extent of the export trade in live horses, the effect of restrictive legislation and the diminution in the number of horses now bred and used for haulage purposes being the most important.

Export of Horse Flesh

Horses which could not be exported, as a result of the Acts of 1910 and 1914, could only find a market in this country as knackers' animals for animal feeding purposes, and so the trade in export of carcases to the Continent developed. No figures are available with regard to this trade, but it is known that a steady trade developed up till about 1928 when France imposed an import duty which made the trade uneconomical, and thereafter the trade was for all practicable purposes, confined to Belgium and continued until the outbreak of hostilities in 1939. Capt. Upton, of Messrs. Harrison, Barber & Co., Ltd., informs me that his firm exported in the region of some 5,000 carcases each year and he estimates that probably some 18,000 to 20,000 carcases were shipped annually from England *via* Southampton, Harwich and Goole. Personally, I think this to be a most conservative estimate and would hazard that the figure was in excess of 20,000 per annum.*

The export of carcases has been prohibited since the early days of the late war and the only outlet for export is the live animal, which Government departments, apparently, fondly suppose to be for the purpose of work. Belgium is the only country with which this trade is carried on and the Belgian Government will not permit the importation of working horses. Any such animals imported are branded on disembarkation with a hot iron and sent for slaughter. The embargo on the exportation of carcases of horseflesh should be removed on the grounds of humanitarianism and national economy. If a horse is to be slaughtered for human food, what sense is there in letting it run the risk of unnecessary suffering, however slight this may be? Under the most desirable conditions, I cannot imagine that a horse would enjoy a sea journey during rough weather.

If the horses exported were slaughtered in this country transport costs would be very considerably reduced and we would give more employment in this country to slaughtermen and those people engaged in the utilisation of slaughterhouse by-products such as hides, etc., thus saving precious dollars and sterling for materials which we now import.

It is sometimes said that horse meat will not keep its bright appearance after slaughter and that, in consequence, the export of live horses is necessary. Horse flesh does lose its bloom much more quickly than beef and the exposed surfaces become very dark in colour, but freshly cut surfaces are perfectly bright and of fresh appearance and, in any case, a reasonably fresh appearance is maintained for about 48 hours. Moreover, it is an indisputable fact that literally thousands of horse carcases were exported to the Continent every year for a number of years and arrived in a satisfactory condition so as to secure a ready sale.

Horse Flesh in this Country

Although much of the horse meat produced in this country has been purchased in the retail shops for small-animal feeding, I think there is little doubt that the majority of it is now used for human food and that public prejudice against horse flesh is decreasing. This may be due to the attempt to popularise whale meat which is often sold in the unbled state and as such does not look as appetising as well-bled horse flesh, but, in any case, householders who have been able to purchase prime, well-matured and well-bled horse flesh for their pet animals and have had to buy, as part of their rations, some of the beef of inferior quality which has been issued, all too frequently, by the Ministry of Food, have been led to think that their pets were better fed than themselves and have been constrained to give the rationed meat to their pets whilst retaining the horse flesh for their own use. Heavy manual workers feel the need for additional meat and, at the present wage levels, can at last afford to satisfy their desires in this direction.

The high prices quoted in the popular Press as being paid for horses for slaughter in this country are, in the main, incorrect. There is sometimes erratic competition amongst the buyers at auction markets and occasionally a buyer will bid well above the value of the animal in order to discourage or embarrass a competitor, but such cases are spasmodic and by no means customary. Many of the reports of the high prices paid for horses for slaughter and the "black market-

* We note from the Rosebery Report reviewed in this issue that the actual figures were as follows :—

1920	15,972	1927	48,662	1934	24,057
1921	24,918	1928	38,391	1935	22,571
1922	38,739	1929	45,095	1936	24,824
1923	53,928	1930	43,778	1937	24,896
1924	61,602	1931	33,884	1938	32,382
1925	64,357	1932	22,111	1939	23,740
1926	46,483	1933	26,248		

—Editor.

ing" in horse flesh are highly exaggerated but there is undoubtedly some evasion of the price and other controls. Unless the Ministry of Food takes effective control of the sale and slaughter of horses for meat (as in the case of animals, the flesh of which constitutes rationed meat), I consider it would be more equitable to modify or remove the present controlled price of horseflesh.

Horseflesh would be more likely to assume its proper place in the national human dietary if the price were controlled at a level more in accord with its nutritive value and the attitude of the Ministry of Food to this meat were more in accord with that adopted in the case of whale meat, which has not found general favour with the public and which cannot be subjected to an efficient or satisfactory system of meat inspection, in spite of the regulations of the Ministry of Food to this end.

It should be stressed that the horse flesh which is on sale in this country for human food must not be confused with knackers' meat. It is of very good quality, of high nutritional value and singularly free from those diseases—particularly tuberculosis—so frequently encountered in the other food animals. Although one is very conscious that horse flesh is not regarded with favour by many people, and indeed that it is actually abhorrent to some people, this attitude cannot be upheld on scientific grounds. There is no doubt that the nation would benefit if some of the meat issued by the Ministry of Food for manufacturing purposes were replaced by horse flesh.

There are no figures available of the total number of horses slaughtered in this country for human consumption but the numbers now must certainly be in the region of 70,000 per annum, a fair proportion of which are imported from Ireland and Scotland. The following were killed in West Ham from 1943–49: 8,000, 11,000, 14,000, 15,000, 19,000, 16,000 and 14,000 respectively. It is known that during 1945 there were over 33,000 killed in various towns in England, 39,860 in 1946, 52,572 in 1947 and in 25 centres in 1948 65,871.

The slaughter of horses in Scotland has assumed large proportions and is now a well-established trade, most of the meat being sent to London and other large towns in England.

Effect of Slaughtering on Horse Population

The availability of horses for working purposes does not appear to have been seriously affected by their export or slaughter in this country, mainly due to the fact that more and more users of horse transport are going over to mechanical transport.

Whilst a relatively prosperous state of agriculture exists this preference for mechanisation will continue. Smallholders and owners of one-man businesses, who formerly purchased "second-hand" horses, not frequently experience difficulty in obtaining serviceable horses of this type at a reasonably low price, since such animals command higher figures for slaughter. From the humanitarian aspect, this may not be altogether a disadvantage since a fair proportion of these animals are aged or well worn and slaughter may be the kindest method of disposal.

It would appear that the market for horses for slaughter has induced some farmers to continue to breed horses, knowing that should they fail to find a market for them for working purposes they can dispose of them for slaughter at a more or less reasonable figure, and it may well be that horses have been retained on some farms for this reason. Breeders of pedigreed heavy horses find that they can get better prices for their sub-standard young stock for meat than as potential workers, and, but for this ready market for the "misfits," some breeders would be disposed to give up breeding entirely.

Horse Breeding

Although one would not attempt to suggest that horses should be bred for meat production in herds like bullocks, it is suggested that farmers should be encouraged to continue the breeding of horses in order to maintain the supply of working horses and at the same time be assured of a market for their surplus animals for meat. It is often questioned whether beef production is an economical proposition in this country and, without the subsidies, obviously it is not so. The prices realised for store cattle in the spring are often greater, per lb. body weight, than the price received when beasts are graded for slaughter. Normally, there is usually—at the best—only a small margin of profit on grass-fed beasts. It is more difficult to show a profit on yard-fed beasts, more especially if the labour involved is calculated, and often the only advantage of this method of feeding is to be derived from the dung made by the bullocks treading the straw litter. With the foods available to-day the manure is of poor quality as compared with that produced in the heyday of the yard-fed bullock.

Horses are intermediate in their feeding requirements to cattle and sheep. Young horses can sometimes be fattened for slaughter on land which would not support cattle so well, and the problem of milk for young animals does not obtain with horses as it does with calf rearing in the dairy herds, with the result that a young horse is better able to fend for himself when weaned than many calves and, after weaning, can be reared and fattened entirely on grass—without the use of imported and subsidised foodstuffs which can also be dispensed with for the breeding and working horse. Plain young horses will often become really fat after six weeks on some pastures upon which bullocks may take three to four months to fatten, if indeed they do fatten at all on such pastures.

The fattening period, however, is a comparatively short period in the actual life of the animal. The cost of breeding and rearing is of great economic importance; especially is this so with calves reared from dairy herds which have to be bucket fed. A mare may be worked for most of the pregnancy and rearing period if required, and this may cheapen the price of the foal rearing compared with calf rearing even in the beef herd. When compared with calves from dairy herds the costs are much more divergent.

Mare's milk has no market value but milk fed to calves, even from a nurse cow, has a by no means negligible market value. In any method of rearing calves from dairy herds, however, there is a considerable item for labour which is not encountered in the rearing of foals. Horse flesh production is not encouraged by any kind of subsidy either on the finished product or on the foodstuffs consumed, but it is penalised by controlled prices which have not increased since their introduction in 1940, yet the trade has continued in spite of these obstacles. The practice of breeding horses is being maintained, however, largely due to the fact that some return is assured, due to the demand for slaughter, and is thus being retained as an established—though minor—part of the economy of some farms.

It should be noted that many of the horses sent for slaughter are unbroken for work, although quiet to lead, and of three to four years of age. Many horses have defects which would render them undesirable for working purposes but a large proportion are sound horses capable of being worked or broken in for work.

Unless a market for horse flesh continues there is no doubt whatever that the breeding of working horses will, even more, decrease very materially and the numbers be reduced to such an extent that it would become very difficult indeed to pur

chase, at an economical price, the right type of horse for working purposes.

Meat Inspection

Meat inspection in relation to horse flesh is a less exacting task than the inspection of beef. Apart from the sheep, no animal killed for human consumption is so free from disease as the horse. *Ante-mortem* inspection is very desirable to detect notifiable diseases such as parasitic mange and to enable the contact animals to be dealt with. Glanders is no longer the scourge it was before and after the 1914–18 war, but one must be always alert for this disease. As with all animals, *ante-mortem* inspection may be the means of detecting an unfit animal which, when killed, might escape detection unless very special care were taken during inspection after slaughter. It also enables one to detect animals unlikely to be suitable for human food and to direct them to the knackery where they properly belong. Tuberculosis is fortunately very rare in horses received in the better-class slaughtering establishments. My experience over the last seven years, during which some 95,000 carcases have been inspected, has been limited to three cases of tuberculosis; all of which were so advanced as to render the total animal unfit for human food. In cattle, the prevalence of tuberculosis necessitates the routine examination of various lymphatic nodes which is rarely necessary in the horse. Incidentally, the lymphatic nodes in cattle (and in sheep and pigs) are large and usually singular. In the horse the lymph nodes are small in size and in clusters or chains and difficult for the inspector who is trained solely in the inspection of the normal food animals to locate.

Oedema—usually physiological in nature (" Monday morning disease," etc.)—is very common, especially where the animals are stalled and kept waiting for long periods in the lairages. In some such cases total rejection is necessary but, in the majority of cases, most of the meat may be passed, after trimming the flanks or other affected parts, and allowing a few hours to elapse before giving final judgment.

In this connection, it has been found that horses are more contented and less liable to oedema if they are not confined in stables during the waiting period but allowed to be free in large sheds or covered yards, with water and a little food available. Straw is suitable as fodder during the 24 hours before slaughter; it satisfies the natural hunger and is less objectionable when the guts are opened—leaving the lining of the stomach and intestines cleaner than those containing hay or grass.

Horses which are left untied should be carefully watched in order that mares on heat, kickers, biters (and other such animals as may injure their companions) can be detected and removed. These animals should be placed in a pen specially kept for their reception.

This system has been in operation in two large slaughter-houses under my supervision and works very well.

Fractures, bruises, fistulous withers, poll evil and similar conditions are occasionally met with but, on the whole, are comparatively rare. The lungs and intestines are surprisingly free from abnormalities. Emphysema of the lungs, total or confined to an odd lobe, is fairly common, but is, of course, of no significance in meat inspection. Livers are rarely edible or, at the best, only partially fit for sale owing to localised chronic peritonitis caused by parasitic larvae invasion. Echinococcus cysts are also fairly common in livers and very occasionally in the lungs.

Horse flesh may not be sold in the ordinary butcher's shop. The Food and Drugs Act, 1938, Section 38, states: " (1) No person shall sell or offer or expose for sale, or have in his possession for sale, any horse flesh for human consumption elsewhere than in a shop, stall or place over or on which a notice in legible letters stating that horse flesh is sold there is displayed in a conspicuous position so as to be visible whenever horseflesh is being sold or offered or exposed for sale.

" (2) No person shall supply horse flesh for human consumption to a purchaser who has not asked to be supplied with horse flesh, or who has asked to be supplied with some compound article of food not ordinarily made of horse flesh.

" (5) Horse flesh means the flesh of horses, asses or mules, and includes any such flesh whether cooked or uncooked and, whether alone, or accompanied by, or mixed with, any other substance, and the expression ' flesh ' includes any part of an animal."

The identification of equine flesh is, therefore, of some importance and it is of equal importance that one should not assert that an article is horse flesh or contains the flesh of horses, asses and mules without sufficient evidence.

It may appear simple to differentiate between the carcase of a horse, ass or mule and that of a bovine. It is, to one familiar with all these animal carcases, but it is not so easy to the uninitiated. The anatomical characteristics of the living animals are not so apparent in the dressed carcase. The horse has, of course, more massive limbs, a longer neck, 18 pairs of ribs (the Arab and Thoroughbred may have 19 pairs) and a sternum with a well-developed keel. It is not considered likely to inspire confidence, however, if one has to lift up the diaphragm and count the ribs before making up one's mind as to the species to which the animal belongs. The sternum will prove a snare and a delusion to the inexperienced, for the cartilaginous keel is always removed in order to facilitate chopping or sawing through the body of the sternum.

To the experienced person, the horse carcase appears relatively larger than the bovine—there are, of course, large bovines and small ponies. The limbs are more massive; larger in the bone and better covered with muscle. The panniculus carnosus or cutaneous muscle in the horse is spread over a large part of the body and—although some portions may be removed accidentally with the hide—most will be left on the outside of the carcase whereas in the ox this widespread muscle is absent and, in a well-nourished beast, a layer of subcutaneous fat covers practically the whole of the carcase. The fat of the horse is usually, but not always, yellow in colour and that of most bovine animals—except those of the Channel Isles breeds—white or creamy, save in the cow when it can be quite yellow. Some horses have white fat, but this is more common in mules and donkeys. A well-finished corn-fed horse is more likely to " die white in the fat " than a grass-fed horse.

The diaphragm of the horse is strikingly long and slopes downwards at a much more acute angle than the relatively more horizontal diaphragm of the bovine. The brisket of the beast is well covered with a cushion of fibrous fat interspersed with a few muscle fibres. The horse has not this fatty cushion associated with the brisket and when the keel of the sternum is removed one sees a mass of red muscle. The neck of the equine is long and is supported by means of the very well-developed funicular portion of the ligamentum nuchae, which is a characteristic feature of the equine carcase. The spines of the cervical vertebrae are well developed and form a hump (the withers) which also serves as a landmark calling attention to the species of the carcase. The differentiation of the sexes is an easy matter in bovines; the characteristic features of the split pubic symphysis of the bull, cow, heifer and bullock are simple to recognise. The horse is slaughtered

over a vastly wider age range than the bovine and the gelding may live for many years after castration, hence the differentiation of the sexes is not so easy in dressed horse carcases. The absence or presence (and the size) of the inguinal canal is, in my experience, the best guide to the sexes in the equine species.

The text-book description of horse flesh is misleading. If one could obtain and compare the meat of horses of the same relative age and sex with comparable bovine flesh, one would be better able to form an opinion on this matter. The absence of inter-muscular fat in the well-nourished horse in contradistinction to the marbling of well-nourished prime beef is characteristic. Another characteristic is the fat of the horse; this is soft in consistency, and when rubbed on the hands (especially if not too recently killed) a faint smell somewhat resembling linseed oil may be detected. The fat is easily washed off the hands and knife with cold water whereas that of the other animals clings.

It would appear that, in describing the difference between horse flesh and beef, the authors of text-books, etc., slavishly copy one another by attempting to compare a piece of beef from a young, well-nourished bullock with the meat from an old worn-out horse. Dark colour and coarseness of "grain" is said to be characteristic of the horse muscle—a young gelding or mare has brighter coloured and finer grained meat than an aged bull. The poorly nourished bovine may lack fat between the muscle bundles. Comparisons to be of value must be drawn from a large number of comparable animals. The easiest and most certain way to differentiate horse from bovine meat is by the fat.

The muscle of the horse contains considerably more glycogen than that of the orthodox butcher's animal, but this tends to disappear 24 to 48 hours after slaughter when horse flesh may contain no more glycogen than the meat from the other food animals. The old glycogen test based on the iodine reaction is, therefore, unreliable and is obviously of no use in sausages and other made-up goods containing cereals. The biological tests—such as the precipitation, the complement fixation and the anaphylactic tests—are the best means of detecting the presence of horse muscle, especially when mixed or made up into sausages, etc. A much more reliable substance for chemical examination is horse fat with its high iodine index and its unsaturated fatty acids, but Dr. Amphlett Williams—a public analyst who has made a study of this subject—has kindly consented to speak on this aspect. He is much more qualified to address you on this matter and I will, therefore, give him an opportunity to add a breath of scientific freshness to this, by now somewhat "hackneyed" subject.

THE IDENTIFICATION OF HORSE-FLESH

Dr. Amphlett Williams: The identification of horse-flesh in food is often extremely difficult, and it is hoped that a short account of the methods used may lead to a discussion from which simpler tests may be forthcoming.

Where one has a piece of raw flesh to examine, even if it is only a small piece, the difficulties are not so great. There are five basic tests which, taken together, will usually distinguish clearly between the flesh of the horse and that of any other animal ordinarily used for food in this country. These tests comprise appearance, odour, glycogen, serological and fat. To deal with them briefly:—

(1) *Appearance.*—Horse-flesh, although similar to beef when first killed, rapidly develops a dark brown colour, which is fairly characteristic, especially in the cooked meat. In fact, if one minces a little of the meat and leaves it in the oven at 100° C. over night, beef, mutton and pork darken in colour, but horse-flesh becomes almost black. The selective development of dark-coloured oxidised compounds in the case of horse may be confirmed by extraction of the dried meat, preferably defatted, with alcohol or with water, when a deep red solution is obtained from the horse, compared with a yellow or light brown solution from the other meats. If desired this colour test can be amplified by measuring the red component produced from a known weight of dried flesh, by means of a photo-electric absorptiometer and comparing the figures obtained with those obtained from the flesh of known species of animals. Or the coloured compounds may be separated by chromatographic adsorption and then examined. It is rather doubtful, however, whether this test justifies further elaboration, as it is of an arbitrary type and the intensity of the red colour in the solution may be affected by a number of factors unknown to the analyst. Whale meat also darkens in colour when dried and heated, and in fact resembles horse-flesh in several of its characters.

(2) *Odour.*—Horse-flesh, on being boiled or roasted, usually gives a characteristic sweetish "mousy" aroma, sometimes resembling linseed oil. But this character varies, according to the condition, and the part of the horse, and although its presence may be considered a definite indication of horse, its absence does not prove the contrary.

(3) *Glycogen.*—When freshly killed, horse-flesh usually contains rather more glycogen than beef, mutton or pork, and its determination used to be applied as a test of identity. But unfortunately there are a number of factors which influence the glycogen level in live meat, and it is fairly rapidly hydrolysed to dextrose after death; hence, if the animal has been dead for a day or more, a low glycogen figure will not prove that it is not horse. As the glycogen becomes converted into dextrose, the dextrose content of the flesh, normally only about 0·1 per cent., will of course rise; and by determining glycogen and dextrose together a more useful figure will be obtained. A dividing line at 1 per cent. glycogen plus dextrose was at one time adopted in Germany. The usefulness of this figure, however, soon disappears, as the dextrose becomes decomposed or lost in other ways.

(4) *Serological Methods.*—The identity of the meat can probably be established most surely by means of the precipitin test, the principles of which will of course be familiar to everyone here. Fairly reliable anti-sera are now available, and by testing an extract of the meat with various animal protein anti-sera until a positive reaction is obtained one can ascertain the genus, though not the species, of the animal. The test needs experience, care and elaborate "controls" before one can rely upon the results. It is extremely sensitive, reacting at 1 in 10,000 dilution, and by using micro technique it can readily be applied to half a drop of extract. The complement fixation test is stated to be 100 times more delicate than this, but it is not in common use in forensic work owing to its greater susceptibility to interfering factors.

One can hardly pass on to the next test without referring at this stage to the very important fundamental work on the structure of the specific animal proteins of the blood and muscle, haemoglobin and myoglobin, which is now being carried out at Cambridge and other physiological laboratories. Perutz, Kendrew and their co-workers[1, 2, 3] have succeeded in crystallising pure methaemoglobin (*i.e.*, oxidised haemoglobin) from various animals, and have investigated the molecular structure of the crystals from the optical characters and X-ray spectra. They found the molecular structure of the methaemoglobin to be the same from different animals of the same species, but different from different species. Tristram[4], Porter, Sanger[5] and other workers have investigated the chemical constitution, and find that the haemoglobins from closely related animals have the same number of open polypeptide chains per molecule and that these chains have the

same terminal amino-acids, although the groups are distinct from each other. This work leads one to hope that identification of species may soon be possible without the necessity for animal inoculation to obtain specific anti-sera; but the methods of the research worker are not yet adaptable for routine analysis, and it is admitted that a much more detailed study would be necessary to establish the precise features of the protein structure which control immunological specificity. It should also be mentioned that most proteins are denatured, suffering an irreversible change in structure, when subjected to heat or to treatment with a variety of chemical agents.

(5) *Fat.*—Horse-flesh usually has much less adherent fat than other meats, and where it occurs the fat is generally of a yellow colour; sometimes almost orange, but rarely white, like suet, mutton fat or lard. Whale meat has practically no visible fat as sold to the public, the oil being almost entirely in the blubber.

If the suspected flesh includes enough adherent fat, a piece may be removed and squeezed between the fingers; in the case of horse fat a quantity of oil will ooze out. This oil has a smell resembling linseed oil, sometimes faint and sometimes strong. The smell becomes more obvious on heating the oil. This test applies to fat from any part of the body, although the neck fat does not yield its oil so readily owing to the tougher, fibrous structure of the fatty tissue; and it provides a distinction between horse-flesh and the other meats used for food, with the exception of rabbit, poultry and game, whose flesh would easily be recognisable in the piece by other characters.

If there is insufficient fat available for this test, what fat there is should be removed and extracted with purest obtainable ether. If there is no detachable fat, the piece of flesh may be extracted with ether; but it should be noted that the intramuscular fat of an animal differs somewhat from the superficial and depôt fat, in that it contains a higher proportion of unsaturated fatty acids, thus giving a lower melting point and higher refractive index and iodine value.

The ether is evaporated from the extract by suitable means, great care being taken to avoid oxidation of the fat, particularly if the amount is very small; and the fat remaining may be purified by re-extraction in petroleum spirit. In the case of horse, the extracted fat is normally of a yellow colour, semi-liquid even in cold weather, and has a smell resembling linseed oil. Beef, mutton and pork fats are solid and almost white, though the intramuscular fats are softer and yellowish.

Though it is to some extent a matter of degree, there is a fundamental difference between horse fat and the fat from other stock reared for food. From a study of published data of fat analyses recorded during the past 50 years, a correlation may be shown between the composition of the fat deposited and the requirements of the animal. The wild animal and the beast of burden require primarily a fat which will constitute a natural reserve which may be, and often is, suddenly called upon to provide extra energy, *e.g.*, for hunting, fleeing or other form of work. Fats from such animals are found to contain a high proportion of liquid unsaturated glycerides, which are readily broken down and converted into simpler, utilisable compounds. They are in fact relatively reactive in the chemical sense. The cow, sheep, pig and goat, on the other hand, require fat partly to keep them warm in cold weather, partly to provide a food reserve which will not be rapidly used up but which will sustain them through prolonged periods when they may not be able to obtain their usual food; in part also the fat may be the result of deliberate fattening by man with the object of providing palatable and nutritious food for himself. In the fat from such animals one finds less of the reactive, unsaturated glycerides, and more of the solid, tasteless, stearates and palmitates.

This correlation between composition and requirements has been found to hold good even between animals of the same genus or species brought up in different environments; the fat from wild animals being more reactive, as shown by iodine values, than that from their tame, domesticated, sisters. For example, recorded iodine values[6] for wild rabbit and hare are 100 and 102, compared with 70 for tame rabbits; wild duck 85 and domesticated duck 59; fox 80 and dog 58.

In the case of horse fat the iodine value varies between 85 and 105; beef and mutton fats range from 40 to 55, and pork fat from 57 to 69. Moreover, the melting point and solidifying point of horse fat is several degrees lower than that of corresponding fat from other animals just mentioned. The refractive index is higher, being about 55 at 40° C. on the Zeiss refractometer scale, compared with 48 to 51 for beef, mutton and pork fats; the Valenta figure, *i.e.*, the critical solubility temperature in acetic acid, is about 45° C. compared with 75° C., the Evers-Bellier figure, *i.e.*, the critical solubility temperature of the fatty acids in alcohol, is about 16° C. compared with 25 to 30° C.; and the percentage of stearic acid is considerably lower. Furthermore, horse fat contains a significant proportion of a glyceride of linolenic acid, an unsaturated fatty acid with three ethylenic linkages which does not often occur in either animal or vegetable fats. This fatty acid is found in linseed oil, however, and its presence may explain why horse fat smells like linseed oil.

$$CH_3CH_2CH=CHCH_2CH=CHCH_2CH=CH(CH_2)_7COOH.$$

Linolenic acid.

Having six unsaturated carbon atoms it is readily brominated, forming an insoluble hexabromide, by means of which its proportion in a sample of fat can be determined. Linseed oil gives about 35 per cent. of insoluble bromides, horse fat 5 to 10 per cent., and beef, mutton, pork, etc., 0 to 0·7 per cent.

Its presence in linseed oil is largely the cause of the drying properties of that oil, and, as might therefore be expected, horse fat also exhibits this property, though to a much less degree. Thus, if a drop of horse fat is placed on a piece of glass and spread in a thin film over about a square inch, with drops of other animal fats for comparison, and kept preferably in a warm place for a few days, the horse fat will become sticky, and form a film over the surface, which may be detected by its wrinkling when stirred by a match stick, whilst the beef, mutton and pork fats will remain in their original condition. Certain other vegetable oils, game and fish oils, exhibit the same feature and must be differentiated by other means.

The diagnostic characters mentioned above will probably be sufficient for identification of the fat, providing enough is available for the tests.

To consider next the question of detection and determination of horse-flesh in prepared meat products: in certain circumstances neither may be possible; for, though a number of methods have been described which can be relied upon when one has a piece of raw meat, they may not be applicable if the meat has been minced, mixed with other substances, and perhaps cooked.

To take the case of a meat pie first: it may be possible here to pick out large enough pieces of meat to apply some of the tests already described. But neither glycogen nor serological tests will be applicable, since the material will have been cooked. The taste and odour will probably be nullified by the spices usually added; and the colour by the browning used in the gravy. If sufficient fat can be secured for a thorough analysis, and if all the analytical results obtained are found to be in accordance, one could still draw a conclusion with confidence; but if any one of the results was

found to be out of line with the others, one would have to regard the identification as unproved.

The case of the sausage may be even more difficult, because there will be no pieces of meat large enough to show any obvious characters. A good deal can be done, however, if one has the time and patience; and here it may be mentioned that although one might be able to prove a negative in a matter of an hour or two, a positive might take upwards of 100 hours' work, before one could be satisfied that the evidence was sufficiently conclusive to justify a criminal charge.

Of the five basic tests, three are impracticable: Appearance, Odour and Glycogen. Sausages always contain starch, some of which is soluble, being derived from bread or rusk, and this penetrates the meat fragments. Consequently, even if the analysis is carried out on carefully dissected fragments of meat, the glycogen determination will be invalidated by an excess of starch, no matter whether staining, precipitation or colorimetric methods are used. The other two tests, Serological and Fat, are quite likely to be complicated by other substances which may be present in the sausage.

The Serological precipitin test can be made more reliable if it is applied to actual fragments of meat, picked out and cleaned by scrubbing under water, instead of being applied to an extract from a portion of the sausage, which might contain almost anything. This requires microchemical technique, and to obtain any quantitative data, a great many separated fragments would have to be tested individually, a very laborious job.

In a straightforward case, an examination of the fat, which is generally extracted from a portion of the sausage in the course of the determination of meat content, will provide a ready indication. Colour, odour, consistency, refractive index and iodine value would be sufficient if one knew that the sausage was made of one kind of meat only, with rusk, salt and spices. But the independent analyst cannot make any such assumption and must reckon with the possibility that the sausage may contain a mixture of odd bits of meat and offal from various animals, including whale; that a low meat content may have been eked out with soya flour, or possibly other oil seeds; and that the fat, which counts substantially as meat for administrative purposes, may have been increased by the addition of any edible oil, crude, refined or hydrogenated, which may be obtainable at the time. (Though it is not intended to convey the impression that such practices are usual.)

If the extracted fat is found to differ from that of beef, mutton or pork fat, therefore, one must first establish the absence of added vegetable oils and fats: soya and other oil seeds can be recognised by microscopical examination of the fibre prepared from the sausage; the presence or absence of any oil or fat other than that natural to the meat can be established by carefully dissecting out a number of meat fragments, cleaning them, and extracting the fat from these fragments by ether. If the characters of the fat extracted from a portion of the whole sausage are found to be identical with those of the fat obtained from these fragments of meat, the possibility of interference from added oils will be disposed of. If the characters differ, one may at least be able to obtain sufficient data from the true meat fat to show the type of animal or whether it is a mixture.

The possibility of whale meat being present provides rather a problem when testing for horse-flesh; particularly so since, owing to whale meat being deficient in oil it is necessary, or at least advantageous, to add beef suet or other fat in order to make a satisfactory sausage. The mixed fat which is extracted in the ordinary analysis may therefore give diagnostic values intermediate between suet and whale oil, possibly consistent with those of horse fat.

Whether the sausage contains such a mixture can be discovered by the method just described for other added oils. If the oil extracted from the sausage derives from whale alone, it will be dark brown in colour, usually with a slightly or strongly fishy odour; it will have a lower melting point, and a higher refractive index and iodine value than horse fat. (Figures found by the author were $<31°$ C.; 70 to 75; 105 to 130; respectively, for intramuscular whale oil.) Whale oil gives about the same percentage of insoluble bromides as horse fat; but the particular unsaturated fatty acid which occurs in whale oil is clupanodonic acid, a fatty acid with four ethylenic linkages, as distinct from the three in linolenic acid, and it consequently forms an octobromide instead of a hexabromide. The bromides can be differentiated by the melting points, and by determining the bromine content.

There are, of course, at least theoretically, other animals whose flesh might be used, *e.g.*, game, rabbit, fox, venison, dog, cat, goat, etc. Their possible presence must therefore be considered also; particularly the first three, which bear fat of a character approaching that of the horse. Comprehensive data for all animals cannot be included here, but the general lines on which they may be recognised have been indicated.

I have been unable to detect any diagnostic difference in the histological structure of the muscular tissue in different animal genera which would be of use in the analysis of meat products, where the tissue might have come from any part of the carcase, and might also have been distorted by mincing and possibly cooking. But a microscopical test from which useful information may be obtained, especially in the case of mixed meats, and where only a small sample is available, might perhaps be mentioned. It is usually possible to separate some fragments of flesh containing adherent or intramuscular fat cells, and the melting point of the fat *in situ*, in each fragment, can then be determined with the aid of a polarising microscope and a hot stage with variable temperature control. This test has the advantage of being available in the case of cooked sausages, where the precipitin test would be out of the question, but it requires experience and carefully controlled technique. Under polarised light the fat crystals show up very clearly in a dark field, and even at room temperature horse-flesh may be distinguished by the comparatively few fat cells containing crystals.

Certain other tests, such as the estimation of methyl guanidine[7] purines[8], choline esterase[9], have been proposed for the detection of horse-flesh, but I have been unable to apply them successfully in the analysis of meat products.

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General Discussion

Mr. T. L. Wright, opening the general discussion, said: Mr. Bywater has covered the subject in a very comprehensive manner and I am left with the simple task of relating the impressions made on me by his concise and well planned delivery:

He has given an insight, which is new to many of us, into the laws and regulations relating to the killing of animals and the premises in which they are killed, and he has propounded definite methods of improvement. He has told us that the export of carcases from this country has been prohibited since the early days of the recent war; that only live horses which are fit for work may be exported, and that Belgium is the only country with which this trade is carried out, whereas the Belgian Government will not permit the importation of working horses. This sounds rather anomalous. Nevertheless, our restriction aims at preventing the overseas transport of horses which are aged and infirm. If the Belgian regulations demand that workable horses imported must be slaughtered, that is of little consequence, provided the waiting period is spent in comfort and destruction is humanely carried out. The branding with a hot iron, unless carried out so lightly as merely to destroy hair, may in itself, be an act of cruelty. The recommendation for the resumption of the export of carcases is welcome.

With regard to the home market, particularly in the prosperous suburban areas, it is doubtful if the majority of horse-flesh purchased in retail shops is bought for human consumption. I think that the widespread aversion to eating horse-flesh springs mainly from sentiment, but if ever there should be any organised movement to establish the breeding of horses primarily for slaughter for human consumption, it would not be logical to suggest that this would be less humane than the similar procedure with regard to cattle and sheep. We all assume that "life is sweet," but, from an animal's point of view, it seems probable that sudden and unpremeditated death after a comparatively short life of ease and comfort, planned to produce the best physical condition, may be better than a long life of hard work with associated ills and injuries, pending the state at which it is considered that slaughter is the only economic end.

One hears statements that small-holders are unable to buy cheap horses for working their land or transport because the competition of the meat market makes them too expensive. On the other hand, one hears also that farmers will not breed or buy horses to work because the younger generation will not devote the necessary time to the care of animals before and after their actual work and at week-ends. Breeders of heavy breeds, to meet requirements up to show standard, say that, without the meat market to absorb the sub-standard stock, breeding would not be worth while financially. The freedom from serious disease of horses as compared with cattle is another striking fact; altogether, it seems that the balance swings in favour of the meat trade, provided, of course, that the whole procedure is carried out with humane methods of rearing, transport, and slaughter.

Here it will not be out of place to comment on transport of horses for any purpose, because an animal which is travelling to his last destination is just as entitled to reasonable comfort and safety as one travelling to a show or race meeting. Lorries used for the conveyance of horses should have the floors and sides reinforced with steel sheeting on the outside. Wooden floors, however well constructed, are liable to get broken and not infrequently one finds that sooner or later a horse kicks a hole through the bottom of the lorry and often gets cast or injures itself in consequence. Floors composed entirely of steel are unsatisfactory; they are slippery even when covered with straw, the straw tending to collect in heaps in the corners or at the back of the lorry. Matting is expensive, of short duration owing to wear and tear and it is objectionable since it readily gets foul with dung and urine. A steel bottom covered with a stout wooden floor is the most serviceable and practicable. Inspection holes or windows are obligatory for road vehicles used for ruminating animals and swine. Surely they are as necessary for road vehicles conveying horses? There should be a limit placed on the time which horses conveyed by road should be allowed to travel without exercise, feeding and watering, to conform to any reduced period decided in the case of horses travelling by rail. In order to reduce the time of journeys consideration might well be given to the desirability of modifying, on unrestricted roads, the present 20 m.p.h. speed limit for heavy motor vehicles, with or without trailers, whilst transporting horses. If horses are conveyed in lorries constructed to accommodate more horses than are actually carried a partition should be provided to prevent undue movement of the animals during the journey. The more closely the animals are packed, within reason, the less likelihood there is of them being thrown down as a result of sudden braking or turning. This applies equally to rail transport and is recognised in the provisions applicable to the sea transport of horses. Provision should, of course, be made for adequate ventilation.

The actual meat trade has grown and we all know that meat is purchased in large amounts for feeding pets—and even for that purpose, to save considerable trouble some people are prepared to pay a lot more than the control price and this may lead to black markets. We hear of horse-flesh being used in various ways for human consumption, and it struck me as strange, on the one or two occasions that I have mentioned the probability of a black market to people in official capacities, they have shown a strong desire to sidetrack the issue; one said that he was "not there to consider a black market. I do not think there is a black market in horses themselves, but there is a black market in delivery of livers." We rarely see livers retailed in the shops. I gather from Mr. Bywater that many horses' livers are not edible and that may be the reason. There is a lot of chatter about a black market but it is difficult to trace it. When horses are bought at exorbitant prices, primarily for slaughter, they cannot possibly be slaughtered through the normal channels as it is not economic to buy at an excessive price and sell openly. The question is where and how are they slaughtered? I heard of a case where a Shire horse was sold for 75 gns. and I was assured it was going for slaughter. I was told that "the poor devil would be taken behind a hedge and have its throat cut." That sort of thing concerns many of us and the question is, to what extent does this black market exist if it does exist at all?

Professor McCunn: Mr. Bywater had made a most comprehensive review of the matter and he did not propose to spend a lot of time discussing the details of the paper; he agreed with Mr. Bywater in most of his points. All of them and especially those who were directed to the profession by virtue of their love of the horse, were sad at the partial eclipse caused by the greatest harbinger of evil the world had ever seen—the internal combustion engine. This invention had enabled evil men to wage sudden war.

Under the old conditions of horse transport the other fellow had plenty of time to prepare his defence; now-a-days the war of destruction might be launched and won almost before the victim has had time to react. Most of their troubles at the present time were due to the internal combustion engine. Could it be possible that the horse, the helpmate of man and one of the prime factors in the advancement of civilisation, was to end its period in such a miserable manner, ousted by the thing it had helped to create? In spite of sentiment, we must be realists and try to make the best of circumstances as they existed. He had no doubt that if there had not been a call by the public for horse meat the bottom would have fallen out of the horse market; the commercial market would have been flooded with unwanted animals and the mature gelding would not have returned sufficient money to the breeder to pay for rearing over five years. The horse meat demand kept the price up and good working horses fetched the fair economic prices that were paid at the present time. Having overcome sentiment he now thought that good could come of these recent developments if the prices for slaughter remained as good as they were to-day. Why not breed and rear horses as they did bullocks and sheep? The better specimens could be retained and by a system of culling the standard of all breeds could be raised. If horses would return more than bullocks why should not farmers breed them for slaughter? He had seen Suffolk foals fetch more than bullocks. In parts of this country they could be range reared and such a system would give them the opportunity to exercise their abilities as to selection and the best could be retained. By these means they could keep up the number of horses on economic and sound lines and should an emergency arise they would have an available pool of animals to draw upon. Were they to sit back and see the equine race become as extinct as the Dodo? Recent necessity had overcome prejudice and sentiment would be satisfied if they insisted that the animals must be treated properly and humanely. Mr. Bywater had dealt with that point in the latter part of his argument and he and the speaker were in agreement on those matters. He would leave the other part of the discussion

to others. He maintained that a great many people in this country had overcome their scruples, religious or otherwise, as to the eating of horse meat. In some parts of the country the horse had been recognised as a sacred animal and even to-day in Kent small boys who saw a white horse would make the sign of the cross. A demand for horse meat had developed and through that demand he could see a way of conserving the horse population which could be turned to the advantage of all concerned.

Mr. Scott: He would like Mr. Bywater to tell them how they stood professionally; the veterinary surgeon was nothing less than a buffer between the proprietor of the slaughterhouse and the public. In London it was up to the local authorities where they employed a veterinary surgeon to say the proprietor must do this or that. In slaughterhouse inspection they might be asked certain things and it was rather important to know; they might have premises where cases were hidden and there was some degree of infestation by rats. One type of case which still bothered him was the animal that had been destroyed with a broken leg on private premises or in the street and where the slaughterman could not bleed the animal; how long after its arrival in the slaughterhouse could he pass that animal for human consumption? In summer time he would not pass a horse for human consumption after three-quarters of an hour, but in winter time he would allow a little longer; what was the procedure? The horse might be worth £25 to £30, or it might have to go for dog meat and be worth only a few shillings. They should press for the killing or horses in the country before being exported to the continent. He could not understand how the Ministry expected that the horses going across to Belgium were going to be worked when they should know that they were only going across to be slaughtered. In the last few days a ship left for Ireland with 500 horses, and made to reach Belgium for the Christmas trade, but the horses were not allowed to land and they were kept in the ship outside for some days. Now that the horses had been landed he did not know how long they were there before they were killed. That was an example of horses leaving the British Isles for the continent, and as a profession they should press that to the utmost. It was suggested that in meat inspection a carcase that was still wet after some hours might be harmless because the animal might have been on grass a long time, but there was no hard and fast rule for the so-called wet carcase. Another type of case was the fistulous withers case which all proprietors were so anxious to trim and have it considered that the rest was all right, but he had taken a strong line and passed only hind quarters.

Mr. Gosling said that the livers were not marketable because one in every three or four was infected with cysts and would not be marketable. Should they allow livers with isolated cysts to be cut away and the remainder passed for human consumption? He did not think they should. As to the black market, he had known people to pay £80 for a carcase and if that did not go into the black market how did they get their money back? It meant that it was taken to an illicit slaughterhouse and delivered in a closed van to some place where they would pay anything for prime meat. As to the wet carcases, he did not like them. It was suggested that it was an *ante-* and not a *post-mortem* cause, but the best way if they had a wet carcase was to "out" it.

Mr. Scott said that most knackermen disliked the black Belgium funeral horse as meat, and he wondered why.

Dr. Hopkirk, referring to the cysts on livers, said that many thousand of lambs' livers were sent to this country and there did not seem to be any detriment to the food value from these lambs' livers. He did not therefore see why one cyst on a horse liver would affect it. Could a permanent trade be developed with disease-free countries in this horse meat? He pointed out that by-products were important and asked, were sufficient quantities saved here? He had attended a conference at Cambridge and was told that one worker wanted pituitary bodies for his work and found it difficult to get the numbers he required. He had asked New Zealand for thousands of lambs' pituitaries but it was an expensive hobby to produce these and it was going to be difficult. He understood that horses were barred by Mosaic law for food and would like to know the reason for it.

Dr. Edwards recalled the days when the horse really meant everything so far as concerned their prospects for making a livelihood in the profession, and when it came about that the internal combustion engine got under way it was thought that there was no work for them in the profession in the future. During that critical stage of the onset of the petrol age he was sent for study to France and came in contact with French conditions and he was surprised at the manner in which the horse slaughter industry was organised in that country. There were separate shops for the sale of horse meat and there was a highly organised system of slaughter houses in Paris for the slaughter of horses destined for human food, horse flesh being considered no less desirable than ox flesh as an article of human dietary. Veterinary surgeons like Césari, Bridré, Guèrin and others, contributed an enormous amount to our knowledge of equine pathology as a result of the careful systematic examinations carried out at slaughterhouses. From the long experience in France at that time, where horses were held in the highest esteem both for work and for food, he did not think that there was any justification for believing that the widespread sale at present of horses for human food would necessarily in itself cause the horse to be dethroned from its former dominant position. At the present time it was mainly children's horses and hunters that fetched good prices and the racehorse industry was as flourishing as ever, and there were other and various reasons why one could not accept it as something deleterious to horse breeding in general that the animals were used for human food. Horse meat generally, he believed, contrary to other meats, escaped inspection in this country and was, but certainly not for that reason alone, a source of danger. That it was so transpired from experiences in Birmingham recently where an outbreak of food poisoning had been traced to families using horse meat in their dietary and steps had been taken by that city to ensure inspection. But one had to be careful not to exaggerate the value of the safeguards provided by meat inspection as ordinarily carried out. At a meeting of the Sections of Epidemiology and State Medicine of the Royal Society of Medicine held recently, when a symposium on Food Poisoning was presented, it was disclosed that their ideas on the value of inspection of meat needed to be drastically recast. The real cause of the food poisoning in most cases could not be detected by any ordinary inspection; it needed expert bacteriological examinations to detect the more common origins which were caused in the main through salmonella infections, and in particular through contamination with those species of Salmonella which commonly were the inhabitants of the smaller rodents (rats and mice) and carried from these rodents by food to man. What thus happened was that the horse meat was also sold, as formerly, as cat's meat; the cat ate mice and the mice infected the cats and contaminated the horse meat and if human beings were infected it was through the mice, cat, horse meat and then man. Indeed, it had even been reported in some parts of America that the ordinary meat inspection by tending to lull the consumer into a false sense of security was a hindrance rather than a help in mitigating outbreaks of food poisoning. He was interested in Dr. Williams' reference to the serological diagnosis but he would like to have heard it treated at greater length. He was not familiar with the histology of horse muscle fibre but he thought there was some difference between it and the muscle fibre of other species if a close study was made of it. In regard to muscle haemoglobins there was some difference at least in the breakdown products of myoglobulin in the horse; as revealed, he believed, by studies upon so-called equine haemoglobinuria. A third method of diagnosis that could be used, but had not been dealt with by Dr. Williams, was allergic diagnoses, which could be carried out in different ways. Where it was the custom to make a broth for tuberculin or mallein manufacture from an infusion of meat, the use of horse meat had now generally been abandoned, because of the non-specific allergic reaction which was produced by the soluble low molecular weight proteins extracted from the meat: hence the development of the so-called synthetic media. It was possible that the degraded proteins produced by partial enzyme action could evoke specific allergic responses, either in sensitised living animals or upon involuntary muscle strips excised from sensitised animals. Such allergic tests had been employed in recent years for the detection of extremely minute quantities of specific protein, such as virus protein. He would like at that stage particularly to thank Mr. Bywater for his remarkably comprehensive and timely survey of this important topical problem from the general veterinary standpoint.

The Replies

In reply, Mr. Bywater said there was no doubt that religious prejudices were partially responsible for horseflesh not being popular. He thought the Druids regarded the horse on a special plane but, in common with other heathens, they ate large quantities of horse meat during their feasts which were regarded with disfavour by the Christians. In the fourth century, a Pope (Gregory III) wrote to a certain Boniface that horse flesh was unclean and an abomination.

He agreed with all Mr. Wright had said about the transport of horses. There were undoubtedly some black market transactions in horse flesh. Some horses were slaughtered surreptitiously, and some were bought at high prices and sold to or by restaurants, etc., as prime beef. The Ministry of Food had taken severe action in respect of diseased cows killed in barns, etc., on farms and he maintained that if the flesh of such animals was unfit for human consumption it was unlikely to be fit for animal feeding purposes unless cooked or sterilised. The Ministry had also taken a few

successful prosecutions for slaughtering on isolated premises in the north Midlands. Regarding the prices paid for horseflesh, it was legal to make a delivery charge and there was no limit to that charge; there were instances of 6d. per lb. being added to the controlled price of 1s. per lb. There was nothing against a delivery charge provided it was not unreasonable. If a prosecution were taken it would be for the court to decide if the delivery charge were excessive. For the time being those who made a charge for delivery were on a good thing. A considerable amount of money was made apart from the meat; the hide, hair and other inedible parts of an animal might be worth anything up to £4. If such a horse were bought for £32 and the meat sold for £30, there would still be a balance of £2; he knew of instances where the slaughterers were satisfied if they made £1 profit per horse, especially if they killed up to 10,000 animals per annum.

Dr. Williams' paper would be read with great interest and would be a source of reference for the profession and a good many public analysts. The shortage of fat in and around the muscles was characteristic of horseflesh. There were fat horses—but generally there was a scarcity of fat and the fat was yellow. He had seen old cows with fat just as yellow as horse fat and he had seen horse fat just as white as mutton fat. Asses' and mules' fat was frequently white. He understood that corn fed horses were more likely to "die white in the fat." The characteristic feature about the horse was the scarcity of subcutaneous fat as compared with the bovine: in the really fat horse the fat was mainly found in the abdominal cavity—around the kidneys. Horse fat dried more readily than most animal fats and was somewhat similar to linseed oil; the blood of the horse also dried more quickly than the blood of other food animals.

Mr. Scott had enquired about the position of a private veterinary surgeon in meat inspection. A veterinary surgeon engaged by a firm to inspect its meat had no legal status under the public health acts. He could advise the owner of the meat if it were fit or otherwise for human food, but, strictly speaking, he could not pass it for human consumption as could an inspector of the local authority, neither had he the powers to reject or seize unfit meat. He was himself a meat inspector for his local authority and whilst in his own area he had the full legal authority in respect of meat inspection, but, if he went outside his area, he had no more authority than any other person and could only advise the owner or the inspector authorised to inspect meat in that area; that was the position of any veterinary surgeon acting on behalf of an individual or a firm. On the question of the suitability of meat for human food, under the Food and Drugs Acts, if an inspector judged the meat unfit, the owner usually voluntarily surrendered it to the local authority for destruction or processing or it might be released to the owner, after being coloured green, for sale as dogs' meat. If the inspector rejected meat but the owner considered it fit for human consumption and was not willing to surrender the meat, the inspector could seize the meat and take it before a justice of the peace to be condemned. Only a justice of the peace was empowered to condemn food, and before the local authority took the matter to the justice it had to give notice to the owner of the time and place of the hearing and he was entitled to be present and give evidence and call expert witnesses in support of his contention. If the justice was satisfied that the meat was unfit for human food he would condemn it and make an order for its destruction or disposal in such a way as to prevent it being used for human consumption. If the justice refused to condemn the food, and thus ordered its return to the owner, the local authority must compensate the owner for any depreciation in value resulting from the seizure and removal of the meat.

Undoubtedly a great deal of salmonella was spread by rats and mice and he abhorred slaughterhouses overrun by rats. Dogs were not allowed in slaughterhouses—their habits of micturition made this undesirable—but cats were allowed as a measure against rats and mice. With reference to horses killed and bled in the street, etc., he knew of no hard and fast rule which could be used to arrive at a decision—it was a matter for the individual judgment of the person examining the carcase after dressing; in hot weather the period between slaughter and evisceration would necessarily be shorter than in cold weather. Casualties are always a source of worry to the inspector. He most readily agreed that horses should be killed here rather than exported. He had recently been to Dublin and had discussed the matter of the shipment of horses to this country and abroad and knew the authorities in Eire intended to increase the supervision of this trade. With reference to oedema, there were two types met with in the inspection of horse carcases. One he preferred to regard as physiological and was similar to that met in mild cases of "Monday morning disease" or rather "filling" of the legs and dependant parts consequent upon partial stasis of the lymphatic flow, due to lack of exercise. It was more commonly seen in horses confined in stalls—hence his preference that horses awaiting slaughter should not be tied up. In cases of localised "physiological" oedema it was the practice to trim off the affected parts, which were usually superficial, and defer judgment for a few hours. If the carcase dried out, and set well, then it could be passed. The whole carcase and all the offals should be rejected if the oedema were generalised. Pathological oedema was brought about by any obstruction to the venous blood flow or lymphatic flow, loss of blood proteins and accumulation of waste products in the blood stream. It was common in consequence of changes in the liver and kidneys, of impaired heart action and in horses recovering from debilitating diseases such as influenza; in cases of pathological oedema, the whole carcase should be rejected. If there were any doubt, the carcase should be re-examined after 12 hours.

As to judgment in fistulous withers cases, he agreed with Mr. Scott that strong action should be taken; it was not sufficient merely to remove the affected meat but an area of apparently normal meat around the affected parts also should be removed. One must be careful that toxaemia was not present, for in this case the whole carcase must be withheld from human food. Cases of fistulous withers with pus running down behind the shoulder were undesirable for food. The best carcases were obtained from stocky cobs, Suffolks and Percherons.

Captain Hopkirk had raised the question of isolated cysts. They could safely be removed from livers. Occasionally the cysts were hardly visible and if they were missed, it was of no great significance since if no scolex were formed no tape-worm could develop from such cysts. Echinococcus cysts were harmless to man if eaten, but not so to dogs and cats in which the tapeworms would develop from the viable scolices present in the cysts. Human beings, of course, could develop similar cysts if they became infested with the eggs passed out by dogs harbouring the adult echinococcus tapeworm. It was important from the standpoint of both animal and human health, therefore, that livers containing echinococcus cysts be not given to cats and dogs.

As to the importation of horse flesh into this country, he knew of no specific prohibition but, of course, a permit from the authorities would be necessary, as with most imports. He was not aware of any attempt to collect and utilise the endocrine glands in horses slaughtered in this country but in the Ministry of Food slaughterhouse many of these glands were collected, from the normal food animals. He could not enlighten Captain Hopkirk entirely with regard to Mosaic law prohibition on horse flesh. It was laid down that "these are the beasts which thou shalt eat, the ox, the sheep and the goat. Those which chew the cud and have cloven hooves." In the middle ages it was thought that the horse transmitted leprosy. Glanders might have been a danger in the past. Dr. Edwards had suggested that in some parts of the country horse flesh might not be inspected; this might well be the case and, of course, where slaughtering took place on unlicensed premises, there was no inspection. There was a strong objection to those premises, owned by small one-time knackermen, with a slaughterhouse and knacker's yard combined. Potentially dangerous meat, from the food poisoning aspect, was not detectable by routine meat inspection in many cases, since it needed bacteriological examination, but he could not agree that routine meat inspection should be abandoned and reliance placed on bacteriological methods entirely. Routine meat inspection should be augmented by bacteriological examination. Cattle and poultry were also carriers of salmonella, as were rats and mice.

Dr. Williams said that he did not wish to give a bad impression about the quality of sausages. He had analysed hundreds of samples and only four or five had actually contained horseflesh. The great majority did now comply with the Ministry of Food requirement of 50 per cent. meat content. During the war the proportion adulterated was higher, at about one in three of the total samples, due mainly to meat deficiencies which could not be checked owing to the extreme shortage of food inspectors, who were on A.R.P., etc., and had little time for their sampling duties. Regarding the variation mentioned in the colour of the fat, it was essential in considering the question of diagnosis to take all the factors into account, and draw definite conclusions only if they were all consistent. Dr. Edwards had raised several interesting points and suggested there was a difference in muscle fibre in the horse compared with other animals; he had examined horse, beef, mutton and pork and he could not see any significant difference after careful measurements. There might be a difference and if so he would like to have details of it, but slight differences from an analytical point of view were of no use, for the fibres were mixed with other substances and possibly distorted by mincing and cooking, and a distinction had to be of a definite character to be of use. Allergic reactions might be regarded as a variety of immunological test, and although highly sensitive would be unlikely to

afford any further information than could be obtained by the precipitin test. The latter had been thoroughly worked out and was probably more practicable, as reliable anti-sera were now readily available. Dr. Edwards had also suggested that there were higher proportions of nitrogenous bases in extracts from horse blood than from beef. It was true that higher proportions of nitrogenous bases had been reported in horse tissues, but similar substances might be produced in other flesh in the course of decomposition, and the analyst had no knowledge of the age of the meat in a sample of sausage. Dr. Edwards had also referred to the haemoglobins in horse meat. A great deal of work had been done on the structure of the specific animal proteins in blood and muscle, and Tristram at Cambridge, who studied the chemical constitution, had found the haemoglobins in closely related animals had the same number of open polypeptide chains per molecule with the same terminal amino-acids. The grouping of amino-acids might be characteristic of the different animal species, but as far as the analyst was concerned, it was a colossal job to identify all the groups in the molecule, and more detailed study was necessary to establish the features of protein structure which were responsible for the serological reactions.

NEW "BRITISH STANDARDS" IN AGRICULTURE

To the issue of *Nature* of March 18th, D. J. Finney contributes a notice covering three booklets* recently published by the British Standards Institution, each of which specifies standards in a particular field of agriculture. The first booklet, "Sampling Milk and Milk Products," was (he writes) originally published in 1938; but improvements in sampling technique have made necessary a revision. The new version of the Standard emphasises strongly the difficulty of obtaining an adequate sample of a bulk of material, especially if the bulk consists of a large number of small packages. Careful attention to details of the sampling is essential if the analytical results based upon the samples are to have any validity. Standard 809:1949 describes the techniques for obtaining samples from milk, cream, butter, cheese and other milk products, but is not concerned with the methods by which these samples are to be tested. That it contains no reference to the statistical aspects of the problem of sample selection is surprising; for example, rules are given for the extraction of small samples from cheese, but no mention is made of the admittedly difficult problem of ensuring that the sample shall give an unbiased and reasonably precise estimate of the qualities measured.

The second booklet specifies performance tests intended to ensure a high standard for rubber used in milking machines, without placing restriction on the type of rubber, and to encourage uniformity between successive batches of rubber parts. The present version of Standard 1578:1949 relates only to natural rubber; but it is intended to include synthetic rubbers in a revised version as soon as sufficient experience of them has been gained.

The increasing interest in the use of vitamin D_3 solutions for the enrichment of poultry mashes has made desirable the specification of standard solutions suitable for incorporation in poultry food. The new Standard 1581:1949, "Vitamin D in Oil for Poultry Feeding Purposes," recommends a sampling according to British Standard 627, followed by a biological determination of potency according to British Standard 911, in order to ensure that the vitamin D_3 content shall be either at least 200 B.S.I. units, or at least 400 B.S.I. units per gram. The Standard also describes the procedure to be adopted in the determination of acidity, for which an upper limit of 2 per cent. (expressed as oleic acid) is specified.

* Sampling Milk and Milk Products (British Standard 809:1949). Pp. 20. 2s. 6d. net. Rubbers for Milking Machines (British Standard 1578: 1949). Pp. 8. 2s. net. Vitamin D in Oil for Poultry Feeding Purposes (Types 200 and 400) (British Standard 1581:1949). Pp. 10. 2s. net. (London: British Standards Institution, 1949.)

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FOOT-AND-MOUTH DISEASE IN HOLLAND

Reuter reports that foot-and-mouth disease is spreading in Holland. In February no fewer than 666 new cases were reported, making a total of 1,223 cases. "According to authoritative sources in The Hague, the Ministry of Agriculture intends to make inoculation against foot-and-mouth disease compulsory in cases where cattle breeders fail to do so at the right moment—*i.e.*, shortly before the animals leave their winter quarters. Everything is being done to stem this threat, as it is feared that otherwise it will be seized upon by other countries as a pretext to forbid import of Dutch cattle."

THE VETERINARY RECORD

April 8, 1950

THE HORSE

IN this issue we publish a report of a discussion which took place at a meeting of the Central Division on "The Horse Meat Business and Related Matters" and also a notice of the report of the Rosebery Committee on the Export and Slaughter of Horses. These topics are of great interest and concern to both the profession and the general public. The limelight is focused again on the horse.

The Rosebery Report, despite its morbid theme, is not devoid of satisfactory features so far as the N.V.M.A. is concerned. The Association is mentioned throughout the report and figures more prominently than any other body, and it is gratifying to note that all, save one, of the representations made by the Association have been received favourably. The report concedes that the trade in horses for slaughter must continue if the breeding of working horses is to survive. Horse meat consequently must be freed from uneconomical price control. The N.V.M.A. had stressed the need to allow the outlet for surplus horses provided by the meat market to continue. The written evidence submitted by the N.V.M.A. may have given the erroneous impression that the rearing of horses specifically for butchering was advocated. The representatives who appeared before the Committee stated that this was not the intention of the N.V.M.A.

The Committee make a number of recommendations concerning slaughterhouses and knackers' yards. These recommendations are in accord with the Association's declared policy. The suggestion that the Public Health (Meat) Regulations, requiring (amongst other matters) notice of intended slaughter, should be extended to include the equine species is upheld. So are certain recommendations concerning the carriage of horses by road and rail.

It is pleasing to note that in more than one instance the representations of the N.V.M.A. and the R.S.P.C.A. were of a similar nature. In no instance was there a conflict of evidence between the two bodies. Both agreed that the export of horse meat is preferable to the export of live horses supposedly destined for slaughter. The Committee concurred with this view and recommend measures to implement it. Both bodies considered that the provision of the Slaughter of Animals Act which requires that the heads of horses and cattle about to be stunned for slaughter must be securely fastened (in practice to a ring in the slaughterhouse wall) should not apply to the horse. This contention is accepted by the Committee. Both bodies urged that wooden floors in road vehicles used for the conveyance of horses should be fitted on steel sheeting. The Departmental Committee does not accept this view and says that it should be sufficient to make it an offence to carry horses in a road vehicle having unsound floor boards. Sufficient experience has been obtained in the carriage of horses as conducted by the slaughtering business to support the view that for the transport of heavy draught horses this provision is likely to be inadequate. At the end of the journey a vehicle which apparently was sound when loaded may be found to have a gaping hole in the wooden floor.

The Committee agreed with both organisations that the speed limit of all road vehicles used for the carriage of horses should be raised to 30 miles per hour.

Past experience has taught us that we cannot take it for granted that the Government will implement all—or indeed

any—of the recommendations of a Departmental Committee, or that, if the recommendations are accepted, statutory force will be given to them in the relatively near future. In this instance, however, we are glad to learn, shortly before we go to Press with this issue, from the Minister of Agriculture's statement in the House—reproduced in our Parliamentary columns—that the Government has accepted the majority of the recommendations of the Rosebery Committee. Notably, the Minister announces that he is making an Order to increase the minimum values of exported horses, with a view to preventing the export of live horses for slaughter, and that the breeding of horses for slaughter should not be encouraged, but that the slaughter of horses in this country for human consumption should be allowed to continue. It is interesting to note, however, that two Government Departments acted in anticipation of the Rosebery Committee's findings. Whilst the Committee was still deliberating, the Board of Trade ceased to issue licences for the export of working horses (which we know in practice are destined for slaughter) and the Ministry of Food removed the price control on horse meat for human consumption (and incidentally on goat flesh and venison) and also on meat for animal feeding purposes. Other recommendations will be considered by the Departments concerned, and some of the decisions will be deferred until there have been discussions with various bodies.

Veterinary Science is founded upon our knowledge of the horse and until some 20 or 30 years ago teaching was predominantly concerned with the equine species. It is sad to reflect that our old friend the horse, which was the main means of livelihood for many veterinary surgeons in the past and provided the basis for the development of the veterinary art, should again occupy the stage, not in his old glory but as a potential source of meat for man and dog.

WORLD FOOD SHORTAGE DANGER

Existing Farmlands Inadequate

In a recent address to the Parliamentary and Scientific Committee (of which Lord Samuel was elected President), Dr. Bunting, chief scientific officer of the Overseas Food Corporation, said that in 50 years' time the population of the world will be about three thousand million persons and it was unlikely the existing farmlands of the world could provide for such a number. In any case, at least 70 per cent. of the world's food was produced by peasants under most backward social and technical conditions, and he could not see, on our African experience, how improved methods for farming could be adopted by these people without at least a degree of further social evolution in the direction of education and co-operative action. Nor did he see how, on the most hopeful estimation, these changes could be brought about in populations totalling over two thousand millions, in the next 50 years.

Large new areas of land must be brought into productivity as a matter of some urgency. There were three main areas to which they might look. The first was the so-called Podsol region, in the northern parts of the American, European and Asian continents, the second the red earth region of tropical South America (where the climatic obstacles, together with the serious difficulty of clearing much of the vegetation, must long delay the development), and the third, and in all ways the most suitable and accessible area, the red earth region of East and Central Africa. In the latter were tracts of unoccupied and largely level country amounting to well over one million square miles, the greater part of which received ample rainfall. It seemed inevitable that East and Central Africa must become the scene of major agricultural development to meet world food needs.

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At the annual general meeting of the Shire Horse Society recently held in Derby, the retiring President, Col. Stanley Bell, contended that we should maintain heavy horse numbers as a national responsibility, and the Government should consider a grant to that end.

REPORT

REPORT OF THE DEPARTMENTAL COMMITTEE ON THE TRADE IN HORSES FOR SLAUGHTER AND EXPORT

This note is by way of amplification of the short preliminary notice which appeared in our issue of March 11th, 1950. The terms of reference are printed *in italics* and are followed by an abridged version of the findings of the Committee.

To enquire into and make recommendations on the Extent of the Export Trade in Horses for work and slaughter and the considerations affecting its continuation for either purpose.

A statement of the number of horses and carcases exported is given as an appendix. Numbers of live horses declined after 1920, when 58,689 were exported, to 9,063 in 1930 and 2,668 in 1939. Since 1937 only one horse was declared as being exported for slaughter. The values laid down by the Exportation of Horses Act, 1937, no longer prevent the export of horses for slaughter. The only control which can be exercised at present is by the Import, Export and Customs Powers (Defence) Act by which no horse or carcase can be exported without a licence. Licences have been granted only in respect of horses guaranteed by the importer to be for work, but there is no demand for working horses on the Continent and the Belgian Government in particular only allow the import of horses for slaughter. Horses should not be sent for slaughter in places where the British Government has no control. We have no reason to criticise the arrangements for transporting the horses, with the best precautions a sea voyage may be uncomfortable and may be the cause of accidents. If horses are to be slaughtered it is better that they should be dealt with in this country where conditions can be controlled and the by-products put to various useful purposes. Licences for working horses for export have now been discontinued and we are of the opinion that they should not be resumed. This view was expressed by the R.S.P.C.A., the International League for the Protection of Horses, the British Horse Society and the N.V.M.A.

The N.F.U. thought that slaughter for human consumption must continue if the breeding of horses is to be maintained. Licences are not at present being issued for the export of carcases. There may be a case for the export of horse-flesh to keep the market open and some licences should be issued.

No horse can be exported unless it is under eight years of age and in the case of a heavy draught horse over £25, a vanner over £20 and an ass over £3 in value. We recommend the values be £80 for a heavy draught horse, £75 for a vanner, mule or jennet and £10 for an ass.

To enquire into and make recommendations on the extent of the practice of slaughtering horses for food for human and animal consumption, the considerations affecting this trade and the effect of export and slaughter on the supply of working horses in this country.

It is not possible to obtain exact figures of horses slaughtered but from figures kept by the Hides Control of the Board of Trade the number would appear to be 130,000 in 1948. This includes horses disposed of in knackers' yards and horses imported from Ireland.

Not only is there a growing demand for horse-flesh but a diminishing demand for working horses. There is some indication that slaughtering has passed its peak. The N.V.M.A., N.F.U. and the British Horse Society consider it essential that the slaughter trade should not be discouraged, otherwise the breeding of heavy horses might decline to a dangerous level. There are enough horses for the present needs of agriculture but this sufficiency may not continue. The farmer may not be able to rely on the tractor to the

extent he now does. It was said that the high prices offered for slaughter made it difficult for farmers to get horses; the N.F.U. do not agree. We are of the opinion that slaughter for human food must continue.

We reached the conclusion that price control on horse-flesh was useless and in some respects deleterious and the Ministry of Food intimated that they would prefer to remove price control.

A puzzling feature has been disentangling the authorities responsible for the supervision of slaughterhouses and knackers' yards which are licensed by the local authorities. The Ministry of Food deals centrally with the Public Health (Meat) Regulations and the Ministry of Health with the licensing and supervision of slaughterhouses and knackers' yards. In Scotland all functions are in the hands of the Secretary of State for Scotland (Department of Health). All responsibility should be with one department. The standard of slaughterhouses varies widely from one place to another; in view of the lack of central control this is not surprising. It should not be left entirely to local authorities—there should be a general standard for the whole country. The best solution would be for the Government to take over all abattoirs where horses are slaughtered for human consumption.

We have no evidence that in licensed slaughterhouses the actual killing is carried out in a cruel fashion. We think humane methods are used but it is clear that some of the provisions of the Slaughter of Animals Act are not properly observed. There are a number of places where there is lack of suitable drinking water and, where horses are detained for more than 24 hours, lack of suitable feeding arrangements. Licensing authorities should exercise stricter control. The Act should be amended to provide that where horses are kept in any place whilst awaiting slaughter they should be provided with sufficient wholesome water and, when the waiting period exceeds 24 hours, with sufficient wholesome food, at intervals of not more than 12 hours. In a number of places visited, the lairage was unsatisfactory. The Slaughter of Animals Act requires the head of the horse to be securely fastened before slaughter. This seems to mean that it should be fastened to a ring in the wall. The N.V.M.A. and the R.S.P.C.A. said this was unnecessary in the case of a horse and it is better if they are held by a man with a halter. Those of us who have experience with horses agree with this view. We doubt if the provision is strictly complied with and recommend that horses should be excluded from it.

We recommend that no horse shall be slaughtered for human consumption except in a public abattoir or licensed private slaughterhouse except in cases of emergency. It has been suggested that no horse be killed for human food unless a veterinary surgeon certifies that it is not fit for work. The Animal Health Division of the Ministry of Agriculture do not think their staff could cope with this work which would have to be done by veterinary surgeons in private practice. We fear it would be impossible to administer such control. The killing of injured horses must be permitted and there is grave risk that the "accident" rate would increase if only unfit horses could be killed. There is no point in forbidding slaughter if the owner has no use for a horse and cannot find a buyer.

We wish to bring to the notice of the Interdepartmental Committee on Meat Inspection the fact that, although local authorities are empowered to inspect horse meat, horse-flesh is not covered by the Public Health (Meat) Regulations and so horse slaughterers are not bound to give notice of intended slaughter. The result must be that inspection of horse meat cannot be as thorough as other types of meat and the Meat Regulations should be extended to cover horse meat and shops where horse meat is sold.

We are disturbed by the fact that in a number of cases the business of horse slaughter for human consumption and of a knacker is carried on within the same curtilage. Although we have no concrete evidence that knacker's meat is being sold for human consumption, it is obviously quite easy for this to be done if the knackery and the slaughterhouse are on the same premises and this should be prohibited. This risk of confusion between knacker's meat and meat intended for human food supports our contention that horse slaughterhouses should be brought under public control.

To enquire into and make recommendations on the desirability or otherwise of encouraging the breeding of horses for slaughter.

We do not think that the breeding of horses for slaughter for human food should be encouraged. The slaughter of horses for human food must continue so as to provide a market sufficient to keep horse breeders in business. That will be sufficient. If the breeding of horses as meat producing animals is positively encouraged, it must be at the expense of cattle and sheep. Nobody who appeared before us favoured the encouragement of breeding for slaughter.

To enquire into and make recommendations on the Statutory Provisions designed to prevent unnecessary suffering by horses while being transported by air, rail, road and sea, and to the slaughterhouse; whether such provisions are adequate and whether they are properly enforced.

There are no regulations governing the transport of horses by air and since the only horses travelling by air are so valuable that their owners may be trusted to take good care of them we see no reason why any regulations need be made.

There is no reason to suppose that the transport of horses by rail is radically unsatisfactory but it should be made obligatory on the railways to feed and water all horses at intervals of not more than 12 hours in place of the present period of 24 hours. Railway rolling stock should bear a label stating time horses were loaded and time of feeding and watering. We believe that on some occasions the transport of horses by railway has taken longer than is strictly necessary. We understand the Railway Executive are setting up a Committee to consider the transport of horses.

The transport of horses by road has given us great difficulty. There has undoubtedly been abuse in this respect. There are no regulations under the Diseases of Animals Acts specifically dealing with transport of horses by road. No offence is committed in crowding horses in a lorry unless there is a breach of the Protection of Animals Act. The Transit of Animals (Amendment) Order governs the carriage of ruminating animals and swine and we feel that it should be made to cover horses or that a new Order should be made to deal with the transport of horses by road. Any regulations dealing with this matter should apply to vehicles carrying the horses of the owner; should make it an offence to carry horses in any vehicle the floor boards of which are not sound; provide that heavy draught horses should not be carried crosswise; that not more than six heavy draught horses should be carried in any vehicle; not more than three abreast; that where more than three are carried there should be a partition between the two groups and when the vehicle is not loaded to capacity there should be a board across the vehicle to keep the horses reasonably well packed.

The speed limit for heavy goods vehicles should be raised to 30 miles per hour to allow of shorter periods of road travel for horses in "heavy goods" vehicles.

Detailed reports are appended of visits to slaughterhouses in various parts of England and Scotland by members of the Committee and upon a visit to Belgium and Holland.

CLINICAL COMMUNICATIONS

INVESTIGATION OF FURTHER CASES OF POLYARTHRITIS IN LAMBS FOLLOWING SERUM INOCULATION

W. T. ROWLANDS, M.R.C.V.S., D.V.S.M.,

AND

C. M. EDWARDS, B.V.SC. (LIV.), M.R.C.V.S.,

MINISTRY OF AGRICULTURE, VETERINARY INVESTIGATION CENTRE, BANGOR

Edwards (1949) reported fully upon the results of an investigation into the aetiology of polyarthritis in lambs during the 1948 lambing season. The condition was shown to be due to inoculation with a commercial serum contaminated with *Erysipelothrix rhusiopathiae*.

The present report deals with the investigation of still further outbreaks of a similar condition occurring in the spring of 1949.

HISTORY.—The history of the cases investigated falls into three categories. In one, farmers had inoculated their lambs with either lamb dysentery serum or pulpy kidney serum which was left over from the previous (1948) spring, some of which had been used at that time with no apparent ill-effect and which was still within the expiry date. In the second instance the serum had been received fresh from the veterinary surgeon, who, in turn, had received it from the producers as " replacement " stock in place of contaminated material issued by them in 1948 and recalled. Finally, a few cases were investigated where serum had been inoculated at the time of the original outbreak in the spring of 1948 but which had not been notified until early in 1949.

INVESTIGATION.—The clinical condition was in every way similar to that reported previously. *Erysipelothrix rhusiopathiae* was isolated on *post-mortem* examination from one or more of the limb joints of representative lambs in each affected flock.

Examination of both partially used and unopened bottles of the suspected serum was made in each case, using the technique previously employed. In addition, a successful attempt to concentrate any possible infection was made by centrifugalising 10 c.c. of test serum. Any deposit so obtained was examined microscopically, culturally and biologically (intraperitoneally into mice). In this way organisms resembling *Erysipelothrix rhusiopathiae* were detected on smear and isolated in culture while a more acute condition was set up in mice. This modification of the test was considered to give more rapid and accurate results. Thus it was possible to confirm the findings of the previous year indicating that the arthritis was, in fact, due to contamination of the sera with *Erysipelothrix rhusiopathiae*.

In the case of those sera which caused no apparent trouble in 1948, it was considered probable that very small numbers of the contaminants were originally present, but had multiplied under the existing conditions of storage, *i.e.*, either in the farmer's kitchen or the practitioner's surgery.

A sample of serum which had been received from the commercial firm concerned in July, 1948, known to have been contaminated originally but since refiltered, was next examined. At the time of its receipt this serum had been tested (by the direct method employed by Edwards) (1948) with negative results and stored continuously meanwhile in the refrigerator. In order to make it simulate the samples stored under room temperature for the corresponding period, this serum was incubated at 37°C. for 48 hours. After this treatment the previously clear serum was noted to be distinctly cloudy. A small quantity was removed and centrifuged at 2,500 for 15 minutes. The deposit so obtained was stained by Gram's method and examined microscopically. Miscellaneous organisms were present but some of them were Gram-positive and appeared to have the morphology of *Erysipelothrix rhusiopathiae*. The deposit was suspended in 1 c.c. saline and 0·5 c.c. injected intraperitoneally into each of two mice. At the end of six days one mouse died, the other had shown the usual symptoms associated with *Erysipelothrix rhusiopathiae* infection but survived. From the dead mouse it was possible to isolate *Erysipelothrix rhusiopathiae* in pure culture.

DISCUSSION.—This investigation emphasises further certain points mentioned by Edwards in his account, *viz.*, (1) that the smaller forms of this pleomorphic organism may pass fairly easily through the normal bacterial filters used for the purposes of sterilisation, (2) that phenol in the usual concentrations will not arrest the growth of *Erysipelothrix rhusiopathiae* (U.S.B.A.I. Report, 1937). It is, in addition, evident that this organism can remain alive in serum at refrigerator temperatures for a considerable period (nine months). It would appear also that slight contamination of such serum kept at room temperature might become so magnified by multiplication of the organisms as to render the serum highly dangerous if used for inoculation purposes in the field.

The importance of this to firms concerned with the preparation of biologicals is self evident. Particularly is this the case in view of Paterson and Heatley's (1938) observation, quoted by Edwards, that natural and spontaneous infection with *Erysipelothrix rhusiopathiae* can occur in horses. It might be suggested that future sterility tests for serum should call for the biological testing of samples which have been incubated. The most disconcerting finding, however, is the inability of phenol, in the accepted concentration, to act as a bactericidal agent. In view of these findings it is considered important that a more efficient " preservative " than phenol be sought for commercial sera.

REFERENCES

EDWARDS, C. M. (1949.) *Vet. Rec.* **61.** 95.

PATERSON, J. S., & HEATLEY, T. G. (1938). *Vet. J.* **94.** N.S. 33.

U.S.A. Bureau of Animal Industry Report. (1937.) 45.

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SUCCESSFUL L.-D. VACCINE-VIRUS TREATMENT OF (?) HARD PAD DISEASE

H. F. HEBELER, M.R.C.V.S.,

LANGPORT, SOMERSET

SUBJECT.—Bulldog bitch ; aged five months.

HISTORY.—On January 11th the bitch was visited with the object of giving the first injection of a canine distemper inoculation. The temperature was found to be 103·4°, although previous readings had been in the normal range, and the injection was withheld. Clinical examination revealed no abnormality and the owner had observed nothing out of the ordinary. Further temperature readings were advised.

12.1.50.—The bitch was now ill, the temperature being 106°. Inappetence, respiratory catarrh and lassitude were very obvious.

TENTATIVE DIAGNOSIS.—Canine distemper ? The uncertainty in making this diagnosis was due to the unusually high temperature.

TREATMENT.—10 c.c. L.-D. canine distemper serum and

20 c.c. hard pad serum was given subcutaneously. Sulphamezathine was prescribed to be given orally twice daily.

13.1.50.—A.M. No improvement. Temperature 105·8°. *P.M.* The respiratory distress was very severe and the temperature was 105·8°; 1 mega unit of procaine penicillin was injected intramuscularly. The owner reported by telephone two hours later that the respiratory improvement was "magical" and the bitch had taken a little milk.

14.1.50.—The temperature was still 105·8°. The bitch was more comfortable but getting weak. There was no appetite and extreme lassitude was shown. A similar dose of penicillin was injected.

15.1.50.—The temperature remained at 105·8° and the previous symptoms were more exaggerated. The penicillin was repeated. After telephone conversations the diagnosis was revised to one of para-distemper (hard pad disease) and treatment in the light of a recent article was decided upon; 5 c.c. of L.-D. vaccine was ordered.

16.1.50.—During the night the bitch had suffered a severe epistaxis, possibly due to weakening of the nasal mucosa by the previous severe respiratory distress. Haemorrhage continued for about 16 hours and, as it was impossible to control it, nearly caused death. The temperature was reduced to 101·5° and the bitch was hardly able to stand.

17.1.50.—The temperature was 100·5°. The mucous membranes were dead white and the bitch just able to stand. Forcible feeding with milk, eggs, glucose, Brand's Essence and brandy commenced; 5 c.c. L.-D. vaccine was injected subcutaneously.

18.1.50 to 24.1.50.—During these six days the bitch gradually improved and gained strength. Metatone and liver extract were given orally and the appetite returned to some degree. No symptoms apart from those resulting from the severe haemorrhage and no hardening of the pads were observed. The temperature gradually rose to 103·4° on 24.1.50 when 1 c.c. of L.-D. virus was injected subcutaneously.

24.1.50 to 27.1.50.—The temperature fell gradually to 101·5° where it has remained since. The bitch improved very rapidly and was now putting on weight. A slight cough was quickly subdued by the exhibition of a simple expectorant mixture.

16.2.50.—The bitch was seen to-day and no sign of any previous illness could be observed.

Discussion.—This case is reported to illustrate the result of treatment of para-distemper by a modification of a method reported earlier in these columns. The fall in temperature and the final improvement following the injection of the virus is considered significant.

The effect of the severe haemorrhage on the course of the disease is not clearly understood but it is possible that controlled bleeding in other cases may prove a useful adjunct to other lines of treatment.

The importance of regular and accurate temperature readings in carrying out the treatment suggested cannot be over-emphasised, especially after the injection of the virus; also of careful nursing—both were of a high order in this instance.

Acknowledgment.—The writer wishes to express his thanks to Mr. S. F. J. Hodgman, of the Animal Health Trust, for his kind interest and suggestions in this case.

Reference

Woodrow, C. E., (1949.) *Vet. Rec.* **61.** 821.

[*Subsequent Note.*—The bitch was examined again on March 17th, when I found her normal in every way. I have nearly completed the successful treatment, by the vaccine-virus method, of two other cases with similar symptoms.]

REVIEWS

["**Neoplasms of the Dog.**" By R. M. Mulligan, M.D. (1949.) Baillière, Tindall & Cox, 7 & 8, Henrietta Street, London, W.C.2. Pp. xi + 135 and 59 plates. Price 31s. 6d. net. Baltimore: The Williams & Wilkins Company.]

During the past few years, Professor Mulligan, who is a medical pathologist, has published a number of very interesting papers about various tumours of the dog, and now, in this book, he gives us what is essentially a detailed description of the macroscopic and particularly of the microscopic appearances of a long series of neoplasms he has studied. Although over 1,500 tumours were examined, the first thousand specimens have been taken for the purposes of statistical analysis. Information is given about the age, sex and breed incidence of the tumours, and some reference is made to clinical features, along with brief suggestions as to surgical treatment.

In the first chapter, the author briefly defines some terms used in relation to neoplasms, and then gives tables showing the ages of the dogs from which the tumours came, their breed where known, and a classification according to type of these tumours. In the chapters that follow descriptions are given of: mammary neoplasms, epithelial neoplasms of skin and related structures, neoplasms of mesenchymal origin and of nerve sheath cells, melanoma, mast-cell sarcomas, lymphosarcomas, histiocytomas, and neoplasms of endocrine glands (including testis and ovary). In a final chapter, the author deals with neoplasms of which he has seen few or no examples—it is surprising to note that these include the epithelioma of the tonsil, which has been quite commonly seen in this country. The reasons for this apparent difference in incidence in the two different parts of the world, should it be confirmed, might be worth investigating. At the end of the book there is a technical supplement, which describes the packing and forwarding of specimens, and the methods used by the author in preparing and staining his sections. Finally, there is a fairly extensive bibliography (the reference there to Withers' paper on the tonsillar epithelioma is wrongly dated). Fifty-nine excellent plates of black-and-white photographs and photomicrographs illustrate the macroscopic and histological features of most of the tumours dealt with, and these should be very helpful to anyone engaged in a histological study of the tumours of the dog. The book is of a handy size, and well produced; seven misprints were noted.

The author had the needs of the veterinary student and veterinary clinician in mind when writing this book, but to some of the former it may prove rather advanced reading, while the latter would probably like to see the clinical side of the book expanded. No doubt further editions will be called for, and the author, in preparing them, feel able to dilate a little on some points, and perhaps cover a rather wider field, with more references to other workers' observations on the types of tumour dealt with, and with detailed illustrative case records and an analysis of the subsequent histories of cases in which surgical or other methods of treatment have been adopted. While the book as it stands will be of most interest to pathologists, medical as well as veterinary, as a description of the pathology of a large number of specimens, it will repay reading by all interested in the tumours of the dog. It is to be welcomed as an important addition to the literature on the tumours of domesticated animals, which is still very scanty as compared with that dealing with human neoplasia.

[" **Poultry Keeping.**" By Charles F. Stacey. (1949.) W. & G. Foyle, Ltd., 119–125, Charing Cross Road, London, W.C.2. Pp. 121. (10 Figs.; 8 plates.) Price 2s. 6d. net.]

A useful and readable little book on the usual lines, of value to all classes of poultry keepers. Little of a controversial nature is included, although few veterinarians will agree with the author's recommendation of the battery system for domestic poultry keepers. A chapter on hygiene and sanitation written by Dr. R. F. Gordon enhances this book. One feels the illustrations of certain breeds of poultry could have been better chosen, the rather bedraggled Brown Leghorn pullet depicted, for example, giving the reader no clear idea of this beautiful bird.

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Also received: **" The Cure of Canine Distemper and Hard Pad."** By Juliette de Bairacli-Levy. Published by *The Farmer*, Goosegreen Farm, Bridgwater, Somerset. Price 10s. net.

ABSTRACT

[**Bovine Leptospirosis.** Sutherland, A. K., Simmonds, J. C., & Kenny, G. C. (1949.) *Aust. Vet. J.* **25.** 197.]

An acute febrile icterohaemoglobinuria of calves characterised by sudden onset, high infectivity and mortality has been known in Queensland for many years. In the coastal belt it clinically resembles babesiosis except in that it appears in younger calves and is more rapid in onset. Death occurs from a few hours up to four days after the recognition of symptoms: characteristics of which are lethargy and rapid fatigue, a respiratory rate of up to 130 per minute, pyrexia 104·0° to 107·2° F., dark red urine, pale and jaundiced visible mucosae. Recovery occupies six to eight weeks and may be followed by permanent unthriftiness.

The authors demonstrated leptospirae in sections of kidney stained by Levaditi's technique. They produced a symptomless thermal reaction in guinea-pigs inoculated intraperitoneally with pooled liver, kidney and spleen tissue from a clinically affected calf. They demonstrated the presence of leptospirae in tissues from fourth passage guinea-pigs by (*a*) Levaditi-stained sections of guinea-pig livers, (*b*) dark field examination of the allantoic fluid of chick embryos inoculated with guinea-pig tissue, and (*c*) cultivation of the organism in Schuffner's modification of Vertwoort's medium inoculated with allantoic fluid from these chick embryos. They recovered leptospirae from the urine of two experimentally infected calves on the eighth and ninth days after inoculation.

Sera from one of these two calves and from guinea-pigs of the second, fourth and fifth passages agglutinated *L. pomona* at high titre but showed no significant agglutination with *L. icterohaemorrhagiae*, *L. australis* A, *L. australis* B, or *L. mitis*.

Recovered calves continue to excrete leptospirae in urine for up to three months. The role of pigs in transmission is not yet understood, but it is noteworthy that after infection with *L. pomona* they may excrete the organism via urine for up to one year (Schmid and Giovanella, 1947). There is a risk of human infection from affected calves.

J. P.

Weekly Wisdom

I exhort all scientific bodies to be—I was going to say distrustful, but, at any rate—careful about words. It is very easy to make them mean too little or too much. Moreover, in every field of study there is an extreme danger of using multitudes of words to express very little.—The Primate.

QUESTIONS IN PARLIAMENT

Horses (Export and Slaughter)

Mr. Dodds-Parker (March 30th) asked the Minister of Agriculture whether he will forthwith increase the value under which no horse shall be allowed to be exported from this country, in accordance with the recommendations of the Departmental Committee on Export and Slaughter of Horses, seeing that he has such power under the Exportation of Horses Act, 1937.

Mr. T. Williams: Yes. I am making an Order to increase the minimum values of exported horses as recommended by the Committee with a view to preventing the export of live horses for slaughter.

If I may be allowed, I should like to take this opportunity of stating that having considered the Committee's report as a whole, the Government accept the recommendations of the Committee that the breeding of horses for slaughter should not be encouraged, but that the slaughter of horses in this country for sale for human consumption should be allowed to continue.

I am circulating below a statement showing the position reached on all the principal recommendations of the Committee. On some of them decisions must be deferred until the necessary consultations with different bodies have taken place and various wider questions of policy have been settled.

Finally, I wish to repeat in public the expression of thanks which I have already conveyed personally to Lord Rosebery and the members of his Committee for their valuable report.

Following is the statement:

The following statement shows the present position on the recommendations of the Departmental Committee on Export and Slaughter of Horses (Cmd. 7888) as summarised on pages 12 and 13 of that report.

(*a*) The Ministry of Food agree that there is a case for the issue of a limited number of licences for the export of horse-flesh to keep the market open.

(*b*) So long as the export of horses is subject to licensing control no licence will be issued for the export of a live horse to the Continent unless there are satisfactory reasons for supposing that it will not be slaughtered. The Board of Trade, in pursuance of the policy of relaxing controls that are no longer necessary, are now considering the question of issuing an open general licence for the export of horses over £100 in value. This limit is considered adequate to prevent any export of horses for slaughter.

(*c*) The Minister of Agriculture and Fisheries is making an Order under Section 1 (1) of the Exportation of Horses Act, 1937, amending the minimum values for horses that may be exported, in accordance with the recommendations of the Committee.

(*d*) The slaughter of horses for sale for human consumption will be allowed to continue.

(*e*) The Minister of Food has made an Order removing the control on the retail price of horse-flesh.

(*f*) to (*n*), and (*r*). These recommendations will be considered by the Ministry of Health, the Ministry of Food and the other Departments concerned, in connection with other matters relating to slaughterhouses in general.

(*o*) to (*q*). These recommendations will be considered by the Inter-Departmental Committee on meat inspection, which has been appointed by the Minister of Food to review the present arrangements for the inspection of home-killed meat in accordance with the announcement made to the House on June 3rd, 1949.

(*s*) The breeding of horses for slaughter will not be positively encouraged.

(*u*) to (*w*). The British Transport Commission and the Road Haulage Association are being consulted on the measures to be taken in pursuance of the recommendations of the Committee for amendments of the Exportation and Transit of Horses, Asses and Mules Order, 1921, and of the Transit of Animals (Amendment) Order, 1931.

(*x*) The Minister of Transport has under consideration the general question of the raising of the speed limit for heavy goods vehicles, and will have regard to the recommendations of the Rosebery Committee.

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Farm Animals (Diseases)

Mr. Higgs (March 30th) asked the Minister of Agriculture what is his estimate of the present annual loss caused to this country by disease among farm animals; and what steps are being taken to expedite the development of the veterinary services with a view to reducing this toll.

Mr. T. Williams: No recent estimate of the annual loss caused by animal disease is available but in their second report, issued in 1944, the Committee on Veterinary Education in Great Britain quoted an estimate of £30 million per annum. As to the second part of the Question, one of the most important steps to improve the facilities for veterinary education and to increase the flow of graduates into the veterinary profession has been the passing of the Veterinary Surgeons Act, 1948. In addition, facilities for veterinary research and the various services and schemes provided or operated by my Department are being expanded as rapidly as circumstances permit.

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Foot-and-Mouth Disease

Sir R. Glyn (March 30th) asked the Minister of Agriculture if he can give any reason, as a result of recent investigation, as to the causes of the scattered outbreaks of foot-and-mouth disease in Wiltshire and Berkshire in recent weeks; and if there is any proof that the infection is carried by bird migrants from Central Europe.

Mr. T. Williams: There have been four outbreaks in Berkshire this year, and although there have been none in Wiltshire there have been eight others in South-East England and the Midlands. In two of the Berkshire outbreaks and at least five of the others the most likely cause is that the animals had contact with infected imported meat or with swill which had been contaminated by such meat. In this series of outbreaks there is no reason to suspect that infection has been carried by migratory birds. There is no doubt that contact with contaminated swill is the most common origin of outbreaks of foot-and-mouth disease in this country, and I should like to remind farmers and all those who handle swill which has not been rendered safe by sterilisation or concentration of the great importance of preventing animals from having any direct or indirect contact with it.

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Slaughterhouses

Brigadier Rayner (March 27th) asked the Minister of Food if he will arrange that animals dealt with in Government slaughterhouses are invariably despatched by the humane killer.

The Minister of Food (Mr. Maurice Webb): Existing instructions already provide for the stunning before slaughter in Government slaughterhouses of all cattle, calves, sheep and pigs except those killed by the Jewish and Mohammedan methods. I am not prepared to prohibit these methods because to do so would stop meat reaching orthodox Jews and Mohammedans.

Brigadier Rayner: Now that he has taken over this Department will the right hon. Gentleman be good enough to interest himself in this question of humane killing? Does he realise that many of the abattoirs in this country are an absolute disgrace? Will he do his best to see that the unnecessary suffering and terror of these animals is brought to an end?

Mr. Webb: In so far as I can help, and in so far as it is my responsibility, I shall be very happy indeed to do so, subject to the consideration I raised in the latter part of my answer.

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Motor Cars (Allocations)

Mr. Edelman (March 27th) asked the Minister of Supply what arrangements he has made with the motor industry for the allocation of cars to the home and export markets respectively.

Mr. G. R. Strauss: The motor industry has been asked to limit the supply of cars to the home market to 110,000 in 1950 and to export the balance of its output. Each manufacturer has been given a quarterly quota for the home market on this basis.

NOTES AND NEWS

Diary of Events

Apr. 12th.—Meeting of the N.V.M.A. Editorial Executive Committee, 2.30 p.m.

Apr. 14th.—Dinner Dance to be held by the Yorkshire Division, N.V.M.A., at Leeds (Guildford Hotel), 7.15 for 7.30 p.m.

Apr. 14th.—Meeting of the Biochemical Society, in the Department of Biochemistry and Pharmacology, University College, Dublin, 3.15 p.m.

April 18th.—Annual Meeting of the Southern Counties Division, N.V.M.A., at Bournemouth, 6 p.m.

Apr. 19th.—Meeting of the Association of Veterinary Teachers and Research Workers, at the Royal (Dick) Veterinary College, Edinburgh, 11 a.m.

Apr. 19th, 20th and 21st.—**Quarterly Meetings of Council and Committees, R.C.V.S.**

Apr. 21st.—Meeting of the Mid-West Division, N.V.M.A., at Bristol (Berkeley Café, Clifton), 2.15 p.m.

Apr. 26th.—Meeting of the South-Eastern Division, N.V.M.A., at Ashford (County Hotel), 2.30 p.m.

Apr. 28th.—Meeting of the Yorkshire Division, N.V.M.A., at Leeds (Hotel Metropole), 2.30 p.m.

N.V.M.A. Council and Committees

The next Council and Committee Meetings of the Association will be held at the Royal (Dick) Veterinary College, Edinburgh, on April 26th, 27th and 28th.

The time-table is as follows:—

Wednesday, April 26th.

11 *a.m.* Veterinary State Medicine Committee.
2.30 *p.m.* Organising Committee.

Thursday, April 27th.

10 *a.m.* Home Appointments Committee.
11.30 *a.m.* Parliamentary and Public Relations Committee.
2 *p.m.* General Purposes and Finance Committee.

Friday, April 28th.

11 *a.m.* Council Meeting.

R.C.V.S. Examinations

May 4th.—R.C.V.S. Animal Management Examinations commence at Dublin.

May 9th.—R.C.V.S. Entries for D.V.S.M. Examinations due.

May 15th.—R.C.V.S. Pharmacology, etc., Examination (Revised Syllabus): Written Examination.

May 17th.—R.C.V.S. Pharmacology, etc., Examination (Revised Syllabus): Orals and Practicals (London and Dublin).

June 8th.—R.C.V.S. D.V.S.M. Written Examination commences, at Edinburgh.

June 22nd.—R.C.V.S. Membership Written Examination.

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Collection of Accurate Data on the Incidence of Disease

This project has been received with some enthusiasm by those who have volunteered to help and it appears that many farmers have shown great interest and are very willing to co-operate, but only about one-quarter of the requisite number of veterinary surgeons are participating to date. Any member, therefore, who would like more particulars is asked to write to the General Secretary, N.V.M.A., 36, Gordon Square, London, W.C.1.

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PERSONAL

Dr. E. G. White Appointed to the William Prescott Chair at Liverpool

The Council of the University of Liverpool have appointed to the William Prescott Chair of Veterinary Preventive Medicine Dr. Edwin G. White, director of the East African Veterinary Research Organisation.

Dr. White, who is 39, was educated at Oxford High School and Newport High School, and entered the Royal Veterinary College in 1928, where he qualified as M.R.C.V.S. and graduated B.Sc. (Vet. Sc.) in 1932. During the period 1933-35 he held an Agricultural Research Council Studentship in Animal Health, and studied for two years at University College, London, and for a third year in Germany, at Freiburg and Leipzig.

He was awarded by the University of London the degree of B.Sc. (Physiology) with first-class honours in 1934, and the degree of Ph.D. in 1941. He was appointed lecturer and research assistant in Veterinary Pathology at the Royal Veterinary College, London, in 1935; reader, in 1939; and acting professor of Physiology, Biochemistry and Chemistry in 1943. In 1946 he gained the Fellowship Diploma of the Royal College of Veterinary Surgeons, and in the same year was appointed a principal scientific officer at the Rowett Research Institute, Aberdeen, a post which he held until 1947, when he became Director of the East African Veterinary Research Organisation, Nairobi, Kenya.

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Mr. Milne's Colorado Appointment.—Mr. F. J. Milne, M.R.C.V.S., has relinquished his post at the Royal Veterinary College (Surgery Department) to take up an appointment in the Department of Veterinary Surgery and Clinics, Colorado A. & M. College, Fort Collins, Colorado. Mr. Milne, who sails on May 4th, will be working there

with Dr. Farquharson, whose colour-film demonstration of techniques in small-animal practice, it will be recalled, was a "high light" of the sessions in the Central Hall, Westminster, in August last.

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Births.—Green.—On March 30th, 1950, to Margaret (*née* Scott) and Reginald Green, PH.D., B.SC., M.R.C.V.S., of 24, Cavendish Avenue, Cambridge, a sister for Timothy.

Milnes.—On March 24th, 1950, to Deirdre M. Milnes (*née* Kenny), M.R.C.V.S., and John N. Milnes, M.D., M.R.C.P., of 35, King Henry's Road, London, N.W.3, a daughter.

Tutton.—On March 28th, 1950, at Burnside, Buckingham Road, Brackley, Northants, to Patricia (*née* Oddie), wife of Edward Allen Tutton, a son—Robert Eaton.

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Marriages.—Logan—Bowen.—The marriage took place on March 25th, 1950, at Flixton Parish Church, between John Barr Logan, M.R.C.V.S., son of Mr. and Mrs. R. Logan, "Tighe-na-Blair," Corrie, Isle of Arran, and Kathleen Bowen, daughter of Mr. and Mrs. Bowen, Flixton, Manchester. Mr. M. M. MacMillan, M.R.C.V.S., Penrith, was best man.

Oates—Deverill.—On April 4th, 1950, very quietly, at the King's Chapel of the Savoy, by the Reader, the Reverend Prebendary Williams-Ashman, William Geoffrey Ronald Oates, Registrar, Royal College of Veterinary Surgeons, and Mary Josephine Deverill.

The bride was given away by Mr. Howard Dawes, O.B.E., F.R.C.V.S., Past-President of the Royal College, and the best man was Sir Gordon (Mr. Justice) Willmer, K.C., O.B.E.

Miss Deverill, except when on war service with the W.R.N.S., has until recently been on the staff of the General Medical Council and has been concerned with the new Medical Act now before Parliament.

Young—Moffat.—On March 30th, 1950, at Ayr Old Church, Archibald Alison Young, M.R.C.V.S., only son of Mr. and Mrs. G. B. Young, 13, Carrick Road, Ayr, to Marion Taylor Moffat, M.A., only daughter of Mr. J. R. Moffat, 21, Greville Road, Southampton, and the late Mrs. H. Moffat

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Mr. Geoffrey West's War Service Award

At a ceremony held at the Greek Embassy in London on March 31st, Mr. Geoffrey West, M.R.C.V.S., received from the Ambassador the Greek equivalent of the Distinguished Service Cross, conferred by H.M. the King of the Hellenes, for services rendered during the war.

Our readers will wish us, on their behalf, to offer their warmest congratulations to Mr. West on the conferment of this notable decoration, in recognition of his war services, upon our colleague, who so recently, to the great regret of the N.V.M.A., vacated the post of Liaison Secretary which he had filled with such distinction.

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R.C.V.S. OBITUARY

Shepherd, Edward, B.V.SC. (LIV.), 10, Booth's Hill Road, Lymm, Cheshire. Graduated Liverpool, July 7th, 1947. Died March 24th, 1950; aged 25 years.

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The Late Mr. Charles W. Crofts, M.R.C.V.S.

In a tribute to Mr. Charles William Crofts, of Northampton, whose death we recorded with deep regret in our last issue, the *Northampton Independent* says that in Mr. Crofts' passing there has been removed a long familiar resident who in his position as a leading local veterinary surgeon for the past 60 years became well known in town and county.

He graduated with honours at the Royal Veterinary College, London, and went to Northampton as a partner with the late Mr. T. Merrick. Mr. Crofts cemented local associations by his marriage to one of the four daughters of the late Mr. W. J. Peirce, who was Mayor of Northampton in 1881 and was the founder of the firm of Peirce, Thorpe and Marriott. When Mr. Merrick died, 47 years ago, Mr. Crofts took over the practice and had carried it on ever since.

"The late Mr. Crofts had a keen love, not only of animals but of nature, which found determined and rather dramatic expression in his refusal to sacrifice a tree in his garden to make room for a wider boundary in St. Giles's Street to the Northampton Co-operative Society arcade. Consequently, the tree had to be propped up and the boundary built round it!"

The funeral service took place at All Saints' Church, the chief mourners being his three daughters, and cremation followed.

GENERAL OBITUARY

Dr. J. I. Quinn

Director of Veterinary Services, Union of South Africa

The sudden death of John Isaac Quinn, D.V.SC., on March 20th, will be deeply regretted by members of the veterinary profession all over the world, particularly by those whose contacts with him were so recent as the International Veterinary Congress in London in August last. To his colleagues in veterinary research it will come as the loss of an eminent personal scientific friend.

The death was quite unexpected and occurred during sleep as he was returning from a tour of Transvaal in company with Norris E. Dodd, Director-General of the Food and Agricultural Organisation of the United Nations.

Born at Klerksdorp in February, 1900, J. I. Quinn was educated at Middleburg, Transvaal, and formed one of the first batch of students at Onderstepoort when a Veterinary Faculty was inaugurated in 1919 in affiliation with the Transvaal University College, now the University of Pretoria. He graduated B.V.Sc. in 1924, was appointed research officer in the bacteriology section of the Veterinary Research Division at Onderstepoort, and later transferred to the section for Biochemistry, Physiology, and Pharmacology. He then specialised in Veterinary Physiology and became lecturer in that subject in the Faculty. In 1928 he graduated D.V.Sc., in 1929 spent a year's study leave in Europe, and in 1934 became full Professor of Physiology, combining this post with that of Senior Research Officer in the Institute. On the retiral of Dr. P. J. du Toit from the Directorship and succession of Dr. G. de Kock in 1947, he became Deputy Director of Veterinary Services. In December, 1949, he succeeded Dr. de Kock, with Dr. R. A. Alexander as Deputy.

As a scientist his earlier work was on anthrax immunity and anthrax vaccine production, but it is mainly on his later work in ruminant physiology that his international reputation rests. His researches on photosensitisation in sheep, on sex hormones, and especially on the physiology of the rumen with special reference to nutrition, are widely known. Many members of the veterinary profession in Britain will remember his excellent colour film of ruminal movements of the sheep, copies of which have been distributed to several leading American and European institutes. Most of his publications, other than papers given at international meetings, will be found in the *Onderstepoort Journal of Veterinary Science*.

He attended the International Veterinary Congress in Zurich in 1938, and in 1949 was the official delegate of the Union Government at the meeting in London.

He leaves a widow (*née* Petronella Woudenburg), two daughters aged 14 and 12, and a son aged six.

H. H. Green.

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Sir Arthur Bagshawe

We regret to record the death of Sir Arthur Bagshawe, C.M.G., M.B., D.P.H., the eminent authority on tropical medicine, which occurred on March 24th, at the age of 78.

As a medical officer in Uganda during 1900-07 he was a member of the Lango Expedition (1901) and accompanied the Anglo-German Boundary Commission (1902-4). He carried out extensive investigations on the tsetse fly and on sleeping sickness. An international conference summoned by the British Government to consider the problem of sleeping sickness had met in London in 1907-8 and had proposed the establishment of a central international bureau "to extract and circulate all new literature on sleeping sickness." The international bureau failed to materialise, but Lord Elgin, the then Secretary of State for the Colonies, established a British bureau of which Bagshawe was appointed the first director. After the bureau had produced four exceedingly valuable volumes of information, its scope was extended to cover other tropical diseases. In 1912 it became the Tropical Diseases Bureau and in 1926, by which date it was distributing information on all aspects of tropical medicine, it became the Bureau of Hygiene and Tropical Diseases. Bagshawe continued to act as director of the extended bureau and as editor of its organ, the *Tropical Diseases Bulletin*, until his retirement in 1935. Besides the *Tropical Diseases Bulletin*, the Bureau also published the *Tropical Veterinary Bulletin*, which was edited by Dr. A. I. Sheather from 1912 to 1916, then by Dr. J. T. Edwards from 1916 to 1921, and again by Dr. Sheather after his return from India, from 1922 to 1932, when it became merged with the *Veterinary Bulletin*, founded by the Imperial (now Commonwealth) Agricultural Bureaux as a main activity of one of its constituents, the Imperial Bureau of Animal Health, under Mr. W. A. Pool.

Sir Arthur Bagshawe's death marks the passing of one of the fast dwindling survivors of a great epoch in tropical disease research, the incentive towards which was largely determined by the remarkable discoveries of the causes of human malaria and sleeping sickness, which are associated with such outstanding names as those of Laveran, Manson, Ross, Bruce and others. Contemporaneously

great discoveries were also made upon the causes of similar diseases in the domesticated animals in tropical countries, such as surra and nagana and Texas and East Coast fevers with which are also associated great names, such as those of Griffith Evans, David Bruce, Theobald Smith, Arnold Theiler and Alfred Lingard. These immense discoveries had their immediate repercussions upon the attitude of brilliant workers, of whom the outstanding example was Paul Ehrlich, towards not only the investigation of but also towards the treatment, therapeutic not less than prophylactic, of disease. The great modern science of chemotherapy can be said to have been born in this epoch, and for long it was almost thought that it was applicable only to such diseases as prevail in hot countries, the outstanding exception being, as we well know, Ehrlich's discovery of salvarsan for the treatment of human syphilis which emanated from the above researches. Then, towards 1934, the astonishing discovery of the use of the sulphonamides by Domagk in the curative treatment of a bacterial infection, followed, only shortly afterwards, by the confirmation and elaboration of Fleming's discovery of the antibacterial action of a mould secretion now immeasurably extended by the discovery of other potent so-called antibiotics, opened up an entirely new vista of discovery.

The rapidity with which such discoveries are now made in succession, once a new principle has been revealed, either accidentally, as in the penicillin episode, or by genius of the Ehrlich type, has come about, not only as the result of public funds being placed more lavishly at the disposal of research workers, but also through the results obtained by workers being more quickly and more certainly placed within the reach of other workers similarly interested. Hence, at the moment, there is little likelihood of the work of an isolated investigator passing unnoticed. It was not so a generation ago, and the greatest possible difficulty was then experienced, especially by the younger research workers, in finding out what had actually been done or was being done in their chosen field of research. Within the British Empire (or Commonwealth as we now prefer to call it), therefore, we must not allow to pass unnoticed the long, weary labours of a man like Bagshawe, who was the first to render a competent, thoroughly reliable, and exhaustive service of the kind to British workers, and which service still remains a model for others to emulate.

Sir Arthur was made a C.M.G. in 1915, was awarded the Mary Kingsley medal of the London School of Tropical Medicine in 1929, and was knighted in 1933. He was honorary secretary (1917-21) and president (1935-37) of the Royal Society of Tropical Medicine and Hygiene.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

RESEARCH INTO THE DISEASES OF DOGS

Sir,—I must thank Dr. Hare for drawing my attention to the misleading Press abridgment of my remarks to a public meeting in support of the Animal Health Trust. I feel I should point out that my actual remarks (abbreviated, no doubt, for the purpose of this report) were as follows:

> "Like all the Animal Health Trust Stations we are pioneers in that we devote our attention to one species. Nowhere else is research devoted solely to the diseases of dogs being carried out for the sake of the dogs themselves."
>
> "With some exceptions, these animals knit most closely to man by generations of companionship and service have been used in research as guinea-pigs."

I could not agree more strongly with Dr. Hare that the veterinary profession has done much valuable work on behalf of dogs, but they have always been handicapped by the lack of a research station devoted entirely to canine problems. This long-felt need is now being met by the Trust's Canine Research Station at Newmarket which has already been of service to the practitioner. It is the first research station of its kind in the British Commonwealth and is maintained entirely by voluntary contributions including those of veterinary surgeons.

Lest I should be misunderstood, I am not claiming that nowhere else is research on canine problems being carried out. The work of the Wellcome Foundation, and this is well known, speaks for itself.

Yours faithfully,
S. F. J. Hodgman.

The Animal Health Trust,
Canine Research Station,
Kennett,
Nr. Newmarket,
Suffolk.
April 1st, 1950.

DEPARTMENTAL COMMITTEE ON EXPORT AND SLAUGHTER OF HORSES

Sir,—May I be allowed to express, through your columns, appreciation of the evidence which was given by representatives of the N.V.M.A. before the above Committee? Their valuable testimony has resulted in the most satisfactory recommendations being made by the Departmental Committee and, judging by the undertaking given by the Minister of Agriculture in the House last night, there is every reason to suppose that many of these recommendations will shortly be implemented.

In this Society's long struggle on the question of the export of horses, dating back to 1897, we are glad to have the opportunity of expressing our profound gratitude to the members of the veterinary profession for the help they have given over that long period and our pleasure at the removal of a dark blot on the good name of this country.

Yours faithfully,
Arthur W. Moss,
Chief Secretary, R.S.P.C.A.

Royal Society for the Prevention of Cruelty to Animals,
105, Jermyn Street,
London, S.W.1.
March 31st, 1950.

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PREGNANCY TOXAEMIA THERAPY

Sir,—In the recent communication by L. B. O'Moore (*Vet. Rec.* **62.** 12) we were particularly interested in the parallel drawn between pregnancy toxaemia and bovine acetonaemia.

We have for some time advocated the adjunctive use of vitamin A (intramuscularly) in acetonaemia, and we also have suggested, in the light of numerous reports received, that this vitamin should be used in pregnancy toxaemia of ewes.

As in the case of the cobalt experiments, the use of vitamin A in pregnancy toxaemia has not been as extensive as we would wish before making claims of specificity but reports so far obtained have been very encouraging—with the qualificaton that treatment should be early.

In the present state of knowledge of these two conditions it seems that the more varied the therapeutic armament with which the veterinarian meets each outbreak, the greater his prospects of individual success.

We should be most happy to co-operate in any further study of pregnancy toxaemia which may be undertaken, as we feel that neither our own earlier work nor that of Halgren and Sandstedt is by any means conclusive.

Yours faithfully,
The Crookes Laboratories, Ltd.,
Ian Conacher,
Veterinary Department.

The Crookes Laboratories, Ltd.,
Park Royal, London, N.W.10.
March 29th, 1950.

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COLLECTION OF ACCURATE DATA ON THE INCIDENCE OF DISEASE

Sir,—We would like to add our support to the appeal made by the N.V.M.A. for greater participation by practitioners in the collection of accurate data on the incidence of disease.

Thanks to the previous efforts of those in the profession, the disease situation in Britain has improved considerably in comparison with that which obtained 50 years ago. Nevertheless, there are still serious disorders in the realms of sterility and mastitis which require further investigation. Records such as we are being asked to keep in co-operation with the farmers are invaluable to the assessment of the extent of these diseases.

We have reached the stage in the world to-day when animal diseases have become a national and international concern due to their detrimental effect on food production, demanding counter measures on an effective scale. We in the veterinary profession must maintain the initiative in creating the required measures. This is part of our responsibility to mankind in answering the world food shortage and bringing about an age of plenty.

Yours faithfully,
C. Nicholson,
I. B. Munro.

"Woodlea," Morpeth, Northumberland.
March 27th, 1950.

[We are very glad to have received the above letter for publication, in support of the frequently reiterated appeal, for the co-operation of practitioners in this project, which, owing to lack of adequate response, we find it necessary to repeat once again elsewhere in this issue.—*Editor.*]